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Amateur Radio

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THE RADIO AMATEUR'S JOURNAL

KENWOOD

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TM-201A/TM-401A

TM-201A/TM-401A "comp-ACT"... tough act to follow.

The word "compact" best describes the TM-201A VHF (a big 25 watts!) or the TM-401A 70-cm (12 watts) mobiles. Measures 5.6Wx1.6Hx7.2D inches (the TM-201A and TM-401A are the most compact rigs available). Ideal in size, their performances are superlative. Each features a HI/LO power switch, dual digital VFO's built-in, 5 memories plus a "COM" channel with lithium battery back-up, memory scan, programmable band scan, priority alert scan, and GaAs FET RF (front end) amplifiers. They have a highly visible yellow LED digital display, a repeater offset switch, a reverse switch, and a "beeper" to confirm operation of various switches. For superior sound quality, the separate, external speaker, can be easily mounted to project the sound in the desired direction. A 16-key autopatch UP/DOWN mic. allows easy remote operation of major front panel functions. Thanks to KENWOOD, compact radios are now available for the popular VHF and UHF bands providing high performance and superior sound quality.

Other TM-201A/TM-401A Optional Accessories:
TU-3 Programmable two-frequency CTCSS encoder, KPS-7A fixed station power supply, MA-4000 dual-bander mobile antenna with duplexer, SW-100A/B SWR/power meter, MC-55 mobile microphone with time-out timer.

Optional FC-10 Frequency Controller
Connects to the TM-201A or TM-401A. Convenient control keys for frequency UP/DOWN MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green LCD display indicates transmit/ receive frequencies, memory channel number, ALERT, and SCAN (with blinking MHz decimal).

TW-4000A

TW-4000A FM "Dual-Bander"
KENWOOD'S TW-4000A FM "Dual-Bander" provides new versatility in VHF and UHF operations, uniquely combining 2-m and 70-cm FM functions in one compact package. It covers the 2-m band (142.000-148.995 MHz), including certain MARS and CAP frequencies, and the 70-cm band (440.000-449.995 MHz), all in a package only 6-3/8 W x 2-3/8 H x 8-9/16 D inches. RF output power measures 25 watts on either band. The TW-4000A features a large, easy-to-read LCD display, front panel illumination for night operations, 10 memories with OFFSET recall and lithium battery backup, programmable memory scan, band scan in selected 1-MHz segments, priority watch function, common channel scan, dual digital VFO's, repeater reverse switch, GaAs FET front ends, rugged die-cast chassis, "beeper" through speaker, a mobile mount, and a 16-key autopatch UP/DOWN mic.

The new optional VS-1 voice synthesizer has everyone talking! A voice announces the frequency, band, VFO A or B, repeater offset, and memory channel number when these functions are selected.

Other TW-4000A optional accessories:
VS-1 voice synthesizer, TU-4C programmable two-frequency CTCSS encoder, KPS-7A fixed station power supply, SP-40 compact mobile speaker, SP-50 compact mobile speaker, MA-4000 dual-band mobile antenna with duplexor, MC-55 mobile microphone with time-out timer, and a SW-100B SWR/power meter.

More information on the TM-201A/TM-401A and TW-4000A is available from authorized dealers of Trio-Kenwood Communications 1111 West Walnut Street Compton, California 90220.

Specifications and prices are subject to change without notice or obligation.

KENWOOD

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TS-430S "Digital DX-terity!"

TS-430S

Digital DX-terity...that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.

Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories:
In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own," the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160 ~ 6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation

KENWOOD

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TS-711A/TS-811A

Multi-function all-mode 2 m and 70 cm transceivers.

The TS-711A 2 m (142-149 MHz) and TS-811A 70 cm (430-450 MHz) all-mode transceivers are perfect base station units, designed to complement your present HF station. Both feature Kenwood's innovative D.C.S. circuitry. Built-in dual digital VFO's provide commercial-grade frequency stability through the use of a TCXO (Temperature Compensated Crystal Oscillator). The new fluorescent multi-function display shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, call sign code, and memory channel. 40 multi-function memories store frequency, mode, repeater offset and tone. They have programmable scan, memory scan, and mode scan. The Auto-mode function automatically selects the correct mode for the frequency being used. When a mode key is depressed, an audible "beeper" announces mode identification in International Morse Code.

The TS-711A/TS-811A also feature all-mode squelch, noise blanker, speech processor (SSB, FM), IF shift, RF power control, alert, and a unique channel Quick-Step tuning that varies tuning characteristics from conventional VFO feel, to stepping action when CH.Q switch is depressed.

Combine all these features with built-in AC power supply and a hefty 25 watts RF output power and you have your ideal base station.

Optional accessories:

- CD-10 Call sign Display
- TU-5 CTCSS Tone Unit
- VS-1 Voice Synthesizer
- MC-60A Deluxe Desk Mic
- MC-80 Desk Mic
- MC-85 Desk Mic
- SP-430 External Speakers
- MB-430 Mobile Mount
- PG-2J DC Cable

TS-670

TS-670 All-mode "Quad Bander."

The TS-670 "Quad Bander" is a unique all-mode transceiver that covers the 6 meter VHF band and the 10, 15 and 40 meter HF bands. FM operation may be added with the optional FM-430. Key features include dual digital VFO's, 80 memory channels, memory scan, and programmable band scan. Direct keyboard frequency selection allows you to enter a frequency to either VFO or to a memory channel using the 10-button key-pad on the front panel. The 2-color fluorescent tube display indicates frequency to the nearest 100 Hz (10 Hz modifiable) and includes LED indicators that signal the specific functions in use. The optional GC-10 general coverage receiver unit allows continuous tuning from 500 kHz to 30 MHz. The VS-1 voice synthesizer unit is another popular option available. All this plus IF shift, all-mode squelch, CW semi-break-in with side tone, narrow-wide filter selection, noise blanker, and R.F. attenuator make the TS-670 "Quad Bander" the next transceiver you should own!

Optional accessories:

- GC-10 General Coverage Unit, 500 kHz to 30 MHz
- VS-1 Voice Synthesizer
- FM-430 FM Unit
- YK-88C 500 Hz CW Filter
- YK-88CN 270 Hz CW Filter
- YK-88A 6 kHz AM Filter
- PS-430 DC Power Supply
- KPS-7A DC Power Supply
- MC-60A Deluxe Desk Mic
- MC-80 Desk Mic
- MC-85 Multi-Function Desk Mic
- VOX-4 VOX Unit

More information on the TS-711A/TS-811A and TS-670 is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut St., Compton, CA 90220

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KENWOOD

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Pocket-size performers!

TH-21AT/41AT

Kenwood's advanced electronic technology brings you a new standard in pocket/handheld transceivers! The TH-21AT/41AT features a high impact molded case and is designed to deliver convenient, reliable performance in a package so small, it will slip into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and only weighs 260 g (0.57 lb) with batteries. In typical Kenwood fashion these transceivers provide superior transmit and receive performance.

Both the 2 meter and 70 cm versions deliver one watt R.F. output on HI power and 150 mW low, for really extended battery life! Functional design includes three digit thumb-wheel switch for easy frequency selection along with a built-in 5 kHz UP-Shift switch and repeater offset switch. (±600 kHz or simplex, 2m version and ±5 MHz or simplex 70 cm version.)

Both the 2 meter and 70 cm pocket/handheld transceivers are available in standard or 16-key autopatch DTMF encoder versions. Kenwood thread-loc antenna connector is also provided.

See your authorized Kenwood dealer and take home a pocket full of 2 m or 70 cm performance today!

Optional accessories:

- HMC-1 headset with VOX
- SMC-30 speaker microphone
- PB-21 Ni-Cd 180 mAH battery
- DC-21 DC power supply
- BT-2 battery case
- EB-2 external C manganese/ alkaline battery case
- SC-8 soft case for TH-21A/41A
- SC-8T soft case for TH-21AT/41AT
- TU-6 programmable sub-tone unit
- AJ-3 thread-loc to BNC female adapter

More information available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220.

TH-21A/41A

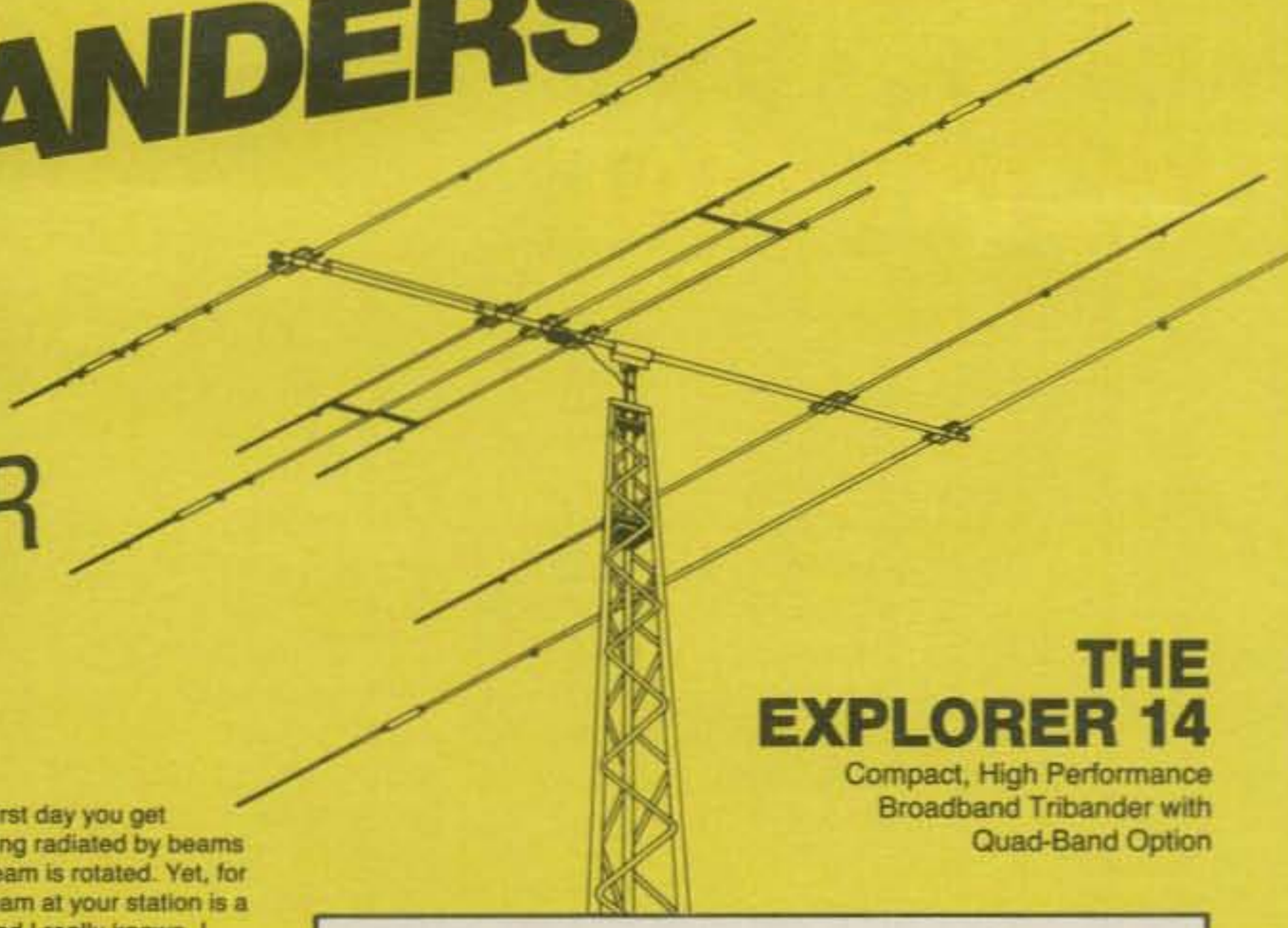
Standard versions.

TH-21AT/41AT
Specifications and prices are subject to change without notice or obligation

hy-gain®

BROADBANDERS

MAXIMIZE THE POTENTIAL OF YOUR HAM GEAR



There is nothing like a beam!

You hear about the importance of the antenna system from the first day you get involved in amateur radio. You hear the big signals on the air being radiated by beams and you hear those same signals virtually disappear when the beam is rotated. Yet, for whatever the reason, getting on the air for the first time with a beam at your station is a down-right exhilarating experience. The universal reaction is "Had I really known, I would have installed a beam years ago".

The gain of a beam multiplies the effective radiated power of your transmitter just like an amplifier. More importantly, it amplifies the signal from the station being beamed. Off the sides and back of the antenna, the effective radiated power of those kilowatts on/near your frequency are reduced to manageable QRP levels.

A well-designed beam is by far the best performance buy you can make and it doesn't use any electricity. Further, if you buy a good one, it will last longer than some of the electronics gear in your shack. In terms of cost per hour of enjoyment, a beam antenna is among the least expensive major station components.

As sunspot cycle 21 winds down over the next few years the priority for a good beam shifts from "great to have" to "essential!" To maximize your station capability on the high bands choose one of these super broadband arrays.

THE EXPLORER 14

The same compact size as the well-known TH3Mk3 it replaces. The driven element uses an open sleeve dipole which is a concept that we call PARA-SLEEVE (Patent Pending). The para-sleeve design achieves the broadband performance objective. The forward gain and front to back ratio is very impressive, especially when compared with other antenna designs in the same size class. 43 lbs. (19.5 kg) of superb performance on a 14 ft. (4.3 m) boom. Turning radius 17 ft. (5.3 m) and 7.5 sq. ft. (.69 m²) of surface area. The EX 14 is the ideal choice where space is limited. Great for roof mount or on smaller towers. Optional QK7-10 kit adds your choice of either 30 or 40 meters to the driven element.

FIVE ELEMENT THUNDERBIRD TH5Mk2

Broadbanding is achieved with our unique dual driven element system. Five elements on the 19 foot boom (5.8 m), with four active elements on each of the three bands. 72 lbs. (32 kg) of rugged antenna with 7.4 sq. ft. (.68 m²) of surface area. Turning radius is a manageable 18.4 ft. (5.6 m).

SEVEN ELEMENT THUNDERBIRD TH7DX

This is a broadband successor to the legendary TH6DXX. Five active elements on 10 meters and four elements on both 15-20 meters. The TH7DX represents the ultimate in high-performance arrays whether you're comparing other large tribander's or stacked monobander's. 76 lbs. (35 kg) with a surface area of 9.4 sq. ft. (.87 m), a 24 ft. (7.3 m) boom and a turning radius of 20 ft. (6.1 m). If you own a TH6DXX, a conversion kit is available which includes the second driven element, the completely new matching system, a full set of stainless steel hardware, and of course, step by step instructions. After conversion, your TH6DXX is a TH7DX, exactly.

FEATURES COMMON TO EX 14, TH5Mk2, and TH7DX:

- Separate Hy-Q traps for each frequency. Factory assembled and individually resonated to insure uniform performance.
- Handles maximum legal power with a respectable margin of safety.
- Unique broadband beta match assures efficient energy transfer and places the entire antenna structure at dc ground.
- BN 86 balun supplied as standard.
- Top quality stainless steel hardware supplied at no added cost.
- Super strong, taper swaged 6063-T832 thick-wall aluminum tubing used throughout.
- Unique Hy-Gain die cast aluminum boom to mast bracket. Accepts mast diameters up to 2½" (63 mm).
- Twist and slip proof die formed heavy gauge aluminum element to boom brackets.
- All tubing deburred and cleaned for ease of assembly.
- Only one set of dimensions for complete coverage of all three bands below 2:1 SWR.
- Designed to survive winds of 100 mph (160 km/hr).

THE EXPLORER 14

Compact, High Performance
Broadband Tribander with
Quad-Band Option

The value of a Directional Antenna was one of my early "discoveries". Over the years, I have built or bought numerous Quads and Yagis. I have never been so impressed as I am with my TH7DX. I enjoy QRP but now have a problem convincing folks that I am only running 5 watts! The TH7DX is a superb antenna, both from a performance and a structural point of view.

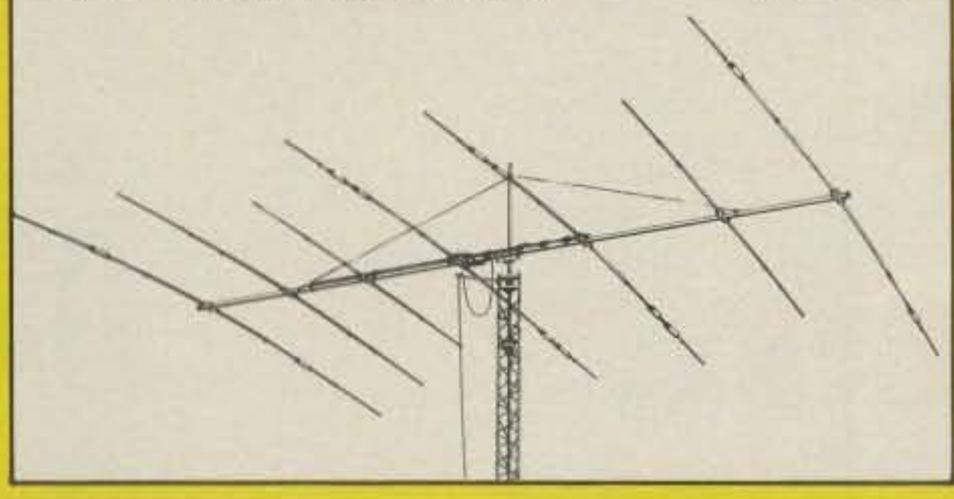
Congratulations!

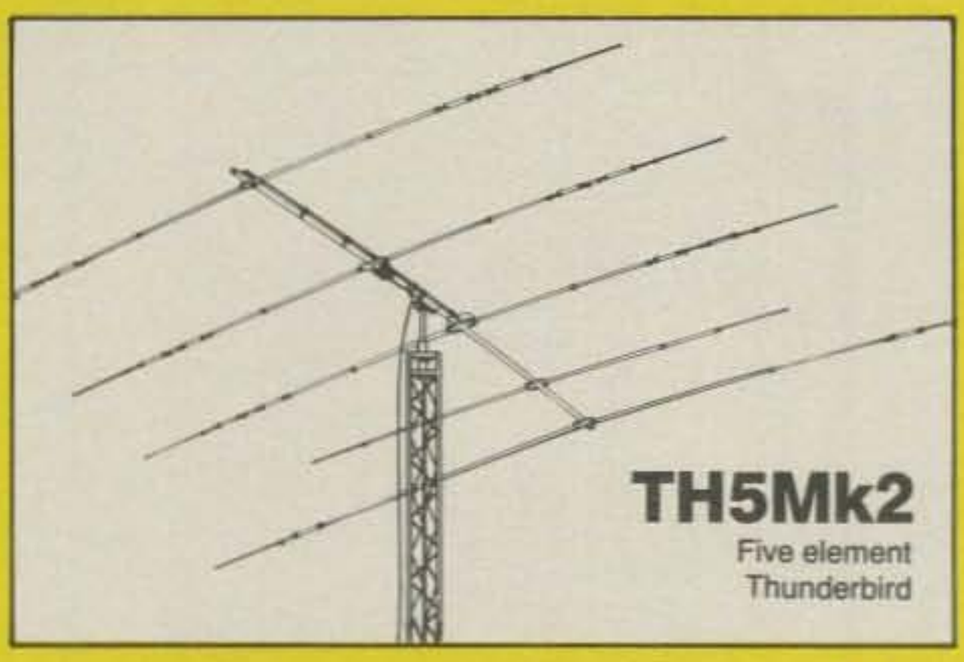
Jack Falker
W8KR

(W8KR has worked all countries but two!)

TH7DX

Seven element
Thunderbird





TH5Mk2

Five element
Thunderbird

TELEX® hy-gain®

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CQ The Radio Amateur's Journal

ON THE COVER: No, it's not the W2LZX antenna site, it's the transmitter building atop Mount Beacon in upstate New York, which houses repeaters for 144 MHz (WA2UGO/R), 220 MHz (WA2AHR/R), 450 MHz (WA2GZW/R), and 450 MHz ATV (WB2ZVI/R) in addition to numerous commercial installations. Bird's eye photo by Larry Mulvehill, WB2ZPI.

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Zero Bias AN EDITORIAL

Well, it's a new year with new beginnings, resolutions, and the bright hope for tomorrow. In addition to personal goals, we all aspire to improve upon what we can do for amateur radio in 1985. I'm talking about a philosophy that includes all of us—not just improving *your* station and cleaning up some TVI in *your* neighborhood. The rest of us are hanging in there waiting for you to make a move.

What Kind of Move?

The answer to the above question is *any* kind of move. We tend to respond, react, and counter moves made *against* amateur radio, but shy away from initiating positive moves *for* amateur radio. If the FCC proposes something or is petitioned for something that some amateurs feel is threatening, then we do react to that threat. We move on something after the fact, whether that fact comes from Washington, local government, or any other source.

With regard to the FCC, amateur radio is represented by the ARRL, *CQ*, and several other interest groups. It's really not enough. The FCC bases its decisions on testimony and information at hand. The information is not always there. Recently we've experienced the latest furor over 220 MHz. This situation has been going on for at least 10 years, but still the only data on hand at the FCC is an outdated repeater directory showing limited interest in the band. What should have been done at the outset, especially by special-interest groups, is to regularly supply the Private Radio Bureau and the Office of Science and Technology with information as to what is going on. We are, in fact, a group specializing in communication, technology, and experimentation. The people who apply for and get STAs (Special Temporary Authorizations) to do experimental work do indeed report on their findings. A number of us have gotten pretty good at letting the media know about the public-service aspect of amateur radio—who helped whom, where and why. We can get items placed in newspapers and magazines, and if the event is really newsworthy, we get it covered on prime-time TV. If amateur radio helps out during a flood or other localized disaster, it is covered in the media. The amateur radio involvement does get good press, as witnessed by the Grenada incident and Dr. Owen Garriott's trip in space. I'm not talking about that in particular, however. That is the overall impression of amateur radio that we put forward to say, in effect, "We do good things in time of need."

While that is excellent public relations for the popular media—exciting, human-interest-type material—there is a limit to what is deemed newsworthy. A series of experiments on one of the amateur bands is hardly front-page news, but it is important. Besides being important to the amateurs involved, it is of interest to other amateurs who may be working on something similar, or it can be the catalyst to get others to begin thinking or doing work. If we take it one step further, and say the work is covered in some form of the amateur press, including a club newsletter, then the coverage admittedly is wider. However, it still is missing the most important segment of readership, and that segment is the FCC. I'm sure that they do receive all of the popular amateur radio magazines, but that in itself is not good enough.

Decisions require documentation. If you are part of a group that has a special interest in any of the amateur bands, put the FCC on your mailing list. I'm not talking about letting them know about your hamfest, but do let them know about any concentrated activity, experimentation, innovation, and any and all technical usage. That is what we can and should do. While this information might not be exciting enough for the 6 p.m. news, it could be the basis for an informed decision.

Some Good News

Herb Pressman, KA2UGV, of our advertising staff recently upgraded to Technician at one of the last tests given by the FCC in New York. This month we have the first of our new VHF Columns and the return of Math's Notes. These two are very welcome additions to our fine series of columns. Next month we'll cover our new VHF Contest completely, including a full set of rules. You'll have plenty of time to prepare for it, and we encourage everyone to give it a try. It's worldwide so there will be something for everyone.

Travels With CQ

Not too much to report this month. We've been spending most of our time here at home. This coming Sunday we will be out at Stony Brook, Long Island for the Ham-Central event sponsored by the Radio Central Amateur Radio Club. This one-day hamfest has been getting bigger each year, and it sort of wraps up the year as far as local events. We did travel to the city a few weeks ago to attend a press conference by Kodak. Lately they have been getting their feet wet in the computer field, and the conference was to let people know about their entry into the high-density disk business. It should be possible to pick up some disks shortly at the same time you pick up some film at your local camera store or film outlet. The quality looks good, and the sources are hard to beat for convenience.

This past Friday I was at the Radio Club of America's annual awards banquet. Fred Link, W2ALU, the club's president, was interviewed in our November 1984 issue. Each time I attend one of the club's functions I come away with the same feeling of awe. Among the guests are people who not only knew but also worked with DeForest, DuMont, Farnsworth, and other greats of what has become the electronics industry. When we look at one of the sleek, new solid-state transceivers, it's hard to truly realize that it wasn't that long ago when the move was from low-vacuum to high-vacuum tubes. It's hard to express, but it certainly is impressive. They have recently chronicled the club's 75-year history into a *75th Anniversary Diamond Jubilee Yearbook*. If you really want to get a feeling for and understanding of the magnitude of what has transpired in the last 75 years, then perhaps you should order a copy. It is available to non-members for $20 from John W. Morrisey, 45 South Fifth St., Park Ridge, NJ 07656. The number of copies available is limited, so if you think you'd like one, order it soon.

Coming Up

January means winter, and winter generally means snow and extremely cold, raw weather. So what does that bring to mind? Well, it's perfect antenna weather. It's the amateur's version of "hitting the slopes," except that the amateur doesn't have to get outfitted in the latest ski fashions. Put away the brochures of Aspen, Vail, and Zermatt; the tower and roof are where it's at. Some of the most creative antenna work comes out during the winter season. This is by way of a reminder that our first Antenna Special issue of the year will be coming up in a couple of months, and traditionally a lot of the designs have resulted from winter expedients. I guess it takes numb fingers and toes to motivate some folks.

Next month when we announce our new VHF Contest we are planning to run several VHF articles and several reviews of popular VHF equipment currently available, just to get you in the mood. We hope that this will get some of the diehard DXers' and HFers' competitive juices flowing, and maybe some of them will take up the challenge. After all, contesting is contesting, isn't it? Well, you have to enter to find out.

As we look at the beginning of 1985 and what it portends for amateur radio, remember that the excitement, the fun, and ever the promise of the new are still there for you to partake of and enjoy. It's like anything else in life. It comes down to what you are going to do this year to take part in what's happening, and what will happen. You can make it work.

73, Alan, K2EEK

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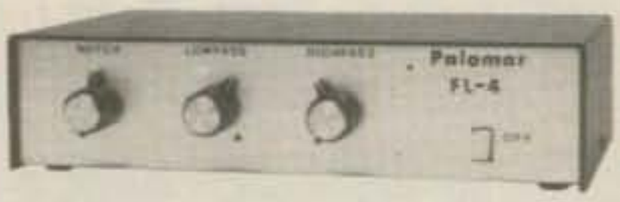

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Our Readers Say:

Let's Open Up 220 To Novices

Editor, *CQ:*

Regarding "The Battle for 220 MHz" (Zero Bias, October 1984 issue of *CQ*), I would like to offer the following suggestion: Why not allow voice transmission by Novices on this band, as well as by Technicians, Generals, etc. The biggest threat to keeping 220 MHz as an amateur band is lack of inhabitants. What would be wrong with opening this band to Novices to learn good voice communication techniques? In addition, the bottom 500 kHz of this band could be reserved for non-voice modes such as c.w. and RTTY. Novices (as well as others) could use this lower part of the band for "over-the-air" code practice sessions, c.w. nets, etc. The main point to consider is this: Would the amateur community be interested in opening up this band to all classes, with a sizable number of Novices using voice modes, or would they rather see the 220 MHz band continue like it is in its largely unpopulated state to be eventually lost to the "land-mobile interests"? It's a case of either use it or lose it!

Steve Strachan, KA5KBM
Fort Smith, AR

Corrections for EK-1 Keyer Article

Editor, *CQ:*

I was pleased yesterday to receive the October issue containing my latest article under its new title: "How To Improve The Vibroplex EK-1 'Brass Racer' Keyer." On the schematic, fig. 1, however, the gremlins are still with us. R2 designation and value (1M) are missing. R4 value should read 500K ohms, not 500. There should be a connecting dot at the intersection of the Q2 emitter line and the one between R8 and D5. Personally, I prefer the military system which makes no "X" connections, only "T's." Then if a dot is missed, the circuit is still correct.

Albert H. Jackson, VE3QQ
Stayner, Ontario, Canada

From Ham License To Centennial Medal

Editor, *CQ:*

It was a matter of some pride that I received a Centennial Medal from the Institute of Electrical and Electronic Engineers last week. The certificate cited me for "exceptional achievement deserving of special recognition." This privilege is a consequence of a long series of events that started with my ham license about 50 years ago, and attests to the values implicit in our hobby. I would be pleased if it were possible for me to share this honor with my many friends through mention in *CQ* magazine.

Arthur S. Westneat, W1AM
Durham, NH

Please QSL, Send Flag!

Editor, *CQ:*

Recall my article entitled "Please QSL, Send Spoon" in the October 1984 issue of *CQ* magazine. I spent a page recounting some of the more unusual requests I have received along with QSL cards: maps, license plates, spoons, stamps, etc. Well, the beat goes on!

No sooner did my article appear in print when the phone rang. "I have some spoons," said the voice on the other end. "Where shall I send them?" I let him know. The very next day along came the postman with a prized piece of postage for all happy hams—a package from "The Bureau." After quickly sorting through some 60-odd QSL cards for new countries and prefixes, I turned to the rest of the mail: two letters from stateside amateurs, one containing stamps from 4S7-land and the other containing an unusual request which prompted this follow-up letter.

No license plates, no spoons—an s.a.s.e., a few green stamps, and a beautiful 7″ × 12″ flag of the state of California! The request? "Please send a flag of the state of Maryland. I collect them." Fortunately I was able to comply with the request in short order and with no great difficulty. By the time you read this, my new friend in W6-land should have yet another banner to add to the decor of his shack. I was, of course, happy to help. Imagine my surprise when the very next day I heard my new friend on 15 meter phone. I broke in and we QSYed for a nice ragchew. So much for spoons and flags!

What ever happened to collectors of QSL cards? A rhetorical question, of course. But if you have any flags, spoons, license plates, maps, or whatever it is that hams amass nowadays, please let me know. I'll see if I can't get you in contact with a fellow amateur who would appreciate whatever it is you have. I would also find great fascination in knowing what else amateurs out there collect. Let me know. Please QSL, send flag!

Mayer D. Zimmerman, W3GXK
Randallstown, MD

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SSB (PBT) XTAL	FL-30	9011.5	2.3
FM Filter	9M15A	9011.5	15 (-3dB)
SSB Narrow (Hygrade Crystal)	FL-44A	455	2.4
OPTIONAL FILTERS			
CW Narrow	FL-52A	455	0.500
CW Narrow	FL-53A	455	0.250
SSB Wide	FL-70	9011.5	2.8
CW Narrow	FL-32	9010.6	0.500
CW Narrow	FL-63	9010.6	0.250
AM	FL-33	9010.0	6.0

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A DXpedition (Almost) To The Comoros

Did you ever dream about going on a DXpedition? Do you enjoy reading about those who do? Do you admire the punctilious precision, the military-like logistics and planning involved? Well, this DXpedition is for the rest of us who are not that curious and know full well that this is how it <u>really</u> is.

BY IAN H. SHEPHERD*, G4LJF

It was 8:30 a.m. Friday, April 29th, 1982. Armed with my TS-830S plus v.f.o., one suitcase, one large kitbag, and a box full of antennas, my XYL drove me to Heathrow airport. I was off to the Comoros for three weeks where I hoped that I would be allowed to operate as I did from 3B8 the past October. After fond farewells and "I'd love to take you with me Dear, but this is in the name of amateur radio and not really a holiday," I checked in for my flight to Paris, where I would catch the connection to Moroni, the capital of the Comoros.

At the security check, all my equipment went routinely through the x-ray machine. Time was short, for the flight was nearly ready to depart. "Right, let's have a look at this lot," said the security man. I opened my suitcase, showed the rig, etc., and then he asked what was in the cardboard box. I explained that it contained antennas, wires and cables, etc., and pointed out that it was all carefully taped up with carrying strings painstakenly arranged for the journey. "Open it," he said. "But I can't," I protested. "Anyway, here is my security card. I work for the airline." The man was not impressed. "Open the box!" Panic set in. I was going to miss my flight and the whole trip was going to be ruined! Frantically I cut through the tape until the box was open. The security man took a quick, disinterested glance and waved me on. Fortunately, I had some spare tape with me for the return journey, and within five more minutes I was on my way to the gate where the flight was thankfully delayed a short while, and I just got on board.

Now a word of advice for those contemplating flying to Charles De Gaulle. Avoid at all costs the need to change terminals, as it takes about one bewildering hour to do, and if you have more than your share of luggage it could put you off flying for a very long time!

Eventually, I found out where to check in for Moroni. About an hour later I was at the front of the queue. I put my suitcase and antenna box on the scales, cunningly concealing my rig and large kit bag beneath the counter. "You have excess baggage Monsieur," the girl said. "How

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In addition, a massive heatsink permits continuous RTTY operation at full power output for up to 30 minutes. Full power for long periods does require the use of the FP-757HD heavy-duty supply.

To the right of the transceiver is the FC-757AT, a fully-automatic antenna tuner designed especially for the FT-757GX. This optional tuner stores in its memory the antenna selection and matching network settings for each band. When you operate that band again, the tuner automatically recalls the matching network settings and chooses the proper antenna.

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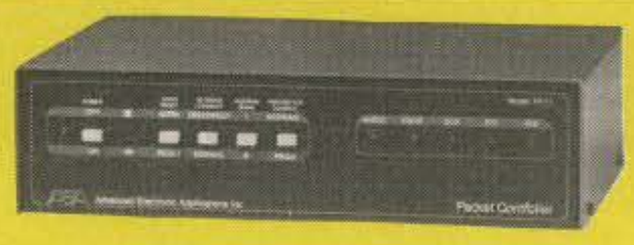

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Alain, D68AM, on the left, and Ian, D68AAB (G4LJF), on the right at Alain's then QTH in May of 1982.

much?" I asked. "Ten kilos," she replied. If only she knew, I thought to myself! I watched her write the charge docket. Ninety francs, I thought, not bad really. I went over to the cashier. "That will be 900 francs Monsieur." "900," I said, "That's impossible; that's more than I paid for the ticket!" Again panic set in. Perhaps I should forget the whole thing and take the next flight home. Rapidly trying to decide whether my budget would allow for £180 (approximately $275) extra for baggage costs, I then explained that I am an airline captain and suggested that I should only pay 10% of the cost. "Oh, you are crew! Then you should have said so! Go and see the supervisor and explain the situation to her." Smiling sweetly at her and trying to recall whether the British and the French had ever agreed upon anything, I put my case to her in my best possible French. The usual much shrugging of shoulders and disinterest was apparent, but as soon as she realized that I meant to stay, she tore up the docket and proceeded to tell off the check-in girl for charging me anything in the first place!

The flight was long and tedious with stops at Nice, Jeddah, and Dar-Es-Salam, and arrived at Moroni at dawn the next day. The Island of Grande Comoro is one large volcano called the Kartala, reaching 7000 feet above the ocean. There is no earth, only volcanic ash and boulders, but it is rich in vegetation and looks inviting from the air.

Wearily I filed through the congested airport building, wondering whether I would get my equipment through. I did not have to wait long to find out! A hand fell upon my shoulder and I was asked to proceed to a small room. "What have you got there?" the customs man asked. I soon gave up trying to explain it to him, as it was too unusual an item. The result was that I exchanged my rig, v.f.o., and s.w.r. meter for a piece of scrap paper as a receipt! My passport was also taken, but would be available the following Monday in the capital, Moroni.

Thoroughly disillusioned, I got into a taxi (that was to charge me ten times the correct rate), and set off to find a hotel. As we drove along the bumpy, but pretty, road, I asked the driver if he had heard of Alain, D68AM, as the only contact that I had had with him was through his box number. He didn't know him, but it was shortly afterwards that I had my first lucky break. We pulled up to ask a boy if he knew of Monsieur Guitou. "Yes," he replied, "I am his houseboy!" Within minutes we were at Alain's house, but he was still asleep, so I wrote out a QSL card and said that I would be at the hotel nearby.

Considering that this was the island's best hotel, I was disappointed to find that my room was extremely hot and uncomfortable. The hole in the wall where the air conditioner had once been was boarded up, one of the panes of glass was broken, and there was no hot water. The room was also inhabited by many flies and mosquitoes. Too bad! I was going to sleep for eight hours!

Not to be, as half an hour later there was a hammering on the door and Alain had arrived! "You can't sleep now," he protested. "You must come and have a beer!" While trying to remain conscious, he explained that he had received my letter, but was unable to keep the proposed sked as his rig had broken down. He had, though, been to the Director of Telecommunications, who was prepared to issue me a license provided that the Commandant in Chief of the army was agreeable. On this point Alain expressed grave doubts that I would be given approval. I should at this stage point out that not even Alain spoke English, and it was soon apparent that not only was I the only English-speaking person on the island, but the only tourist as well! Fortunately, I had a reasonable grounding in French while at school, and faced with no alternative, it soon came flooding back.

Monday evening Alain took me to see Commandant Ahmed Mohomed, C in C of the army. Fortunately, he was in good humor, and after showing him my 3B8 license, QSL cards, and lots of photos, he agreed to my operation. By late afternoon Tuesday, after several visits to Army headquarters, Telecomms, customs, and immigration, I had taken on a new identity—D68AAB! The license cost, incidentally, £12 (approx. $18) and was valid for three weeks only!

Clutching my equipment, which I had found in the corner of a large customs warehouse down by the port, I got into a *taxi brouge* for the trip back to the hotel. A *taxi brouge* is like a sawn-off car with the back half converted into a small truck, covered with a canvas awning. Twenty people inside (and hanging onto the outside) is common, with everything from raw fish, meat and vegetables, to firewood pots and bedding heaped upon the passengers' feet! An h.f. rig was indeed a curious cargo to the passengers!

Frustration was now at its peak, so I hastily threw together my three-band vertical, and I found that by leaning it against one corner of my room, I could get a reasonable match on 10 meters! Anxiously I put out my first CQ call, wondering if anyone could possibly hear me. To my astonishment a ZS came back with 59!

Six contacts later Alain was knocking on the door. He had a sked that evening with Peggy, WB2OHD, his QSL manageress, and suggested that we share my rig at his house until he could get his fixed. Half an hour later I was hooked up to his TH2 and I put out my first call in earnest. It was as if the whole world knew that I was there. The pile-up was immediate and fierce. The humidity, excitement, and relief were too much, and I broke out in perspiration, wondering if I would ever be able to get a QSO out of the wall of snarling sound coming from the speaker! Alain was surprised too and quickly produced a cold beer to help the bewildered operator!

It was from Alain's house that I operated for the next few days, but as he was not always at home, and as the shack was in his bedroom, my operating hours were severely limited. Also, I wanted to get my l.f. aerials up, so on Friday I decided to move up to a beach hotel on the north of the island at Malouja. Coincidently, Alain was ordered out of the house that he had lived in for three years the very next day, and he now resides in a very poor QTH next to noisy 5000 volt power cables in Moroni.

If the first hotel had seemed bad, then

it was heaven compared to where I was to spend the next two and a half weeks. The only water was supplied in a bucket each morning, the mosquitoes were relentless, and I was the only guest! But it did have a very nice beach with palm trees and an enthusiastic staff. I soon had a boy climbing up one of the palm trees with my inverted Vees for 40 and 80 meters, and soon had someone find a rusty old piece of angle iron on which to mount my vertical. A large pile of rocks was heaped around the angle iron, and the antenna stood proudly erect about 5 feet above the ground. I must admit that I had my doubts that anyone would hear me after the TH2, and compared with my KLM and SB-220 at home, it looked just too frail to work. But work it did, and very well too. Pile-up after pile-up, and now I would be able to work through the night—or so I thought!

That evening I was working SM5KI at 2000Z. He asked me a question, and I pushed the PTT to reply. All the lights went out! Again panic. Surely the mighty TS-830 had not been too much for the local electricity supply? Desperately I sat there in pitch blackness waiting for the supply to be restored and hoping that my Swedish friend would still be there. But after half an hour the only sound in the room was the whining of the mosquitoes, and I realized that I was off the air. Reluctantly I tried to find the bathroom only to walk into the sharp edge of a wall instead. Stunned and depressed I collapsed onto my bed, wondering what the rest of the pile-up was thinking about my abrupt departure. Would they realize what had happened?

The next problem soon became apparent. Having a pile-up going on all day in the headset is rather akin to being brainwashed. When you take the headset off at night, the noise is still there, and sleep is impossible. A sleeping pill each night was essential if I was going to last. To give you an example of what the pileups were like, one night I had a pipeline into Japan. From calling QRZ to identifying the first station took at one time eight whole minutes on my stopwatch! Eight agonizing, earsplitting, God-what-am-I-doing-here minutes! At 5:30 a.m. next morning the power came on. So did the rig and all the lights!

The hotel explained to me that the island was fast running out of oil, and that the power station would be shut down each night from 11 p.m. until 5:30 a.m. So much for my through-the-night operation! I did manage to work quite a few Ws on 20 meters from 5:30 a.m. until about 8 a.m., when all propagation disappeared until about midday, when 10 meters opened up into Europe. Of course, 40 and 80 meters were somewhat hampered, too, but I did make it into Hong Kong and Europe on 40 and 80, but always into Europe just as the power went off!

One of the other problems was that I only had one feeder cable, and stumbling about in the dark outside over the lava rocks to change antennas soon produced bashed and bleeding toes, and much off-the-air cursing! There is no doubt that two feeders would have made life much easier, especially when working those enthusiastic DXers who want to try you on five bands in as many minutes!

Gradually I settled down into a routine, and looked forward each night to the half-hour rag chew with my QSL manager, Brendon, G4DYO, and other members of the Chiltern DX Club. It made me realize just how marvelous amateur radio really is. Here I was in this dreadful place hearing all my friends booming out of the loudspeaker as if they were there with me—All via a piece of aluminum tube sticking out of the sand! There is no doubt that Marconi made one of the most marvelous discoveries of all time.

Halfway through my second week I was joined by the other tourist—or was he? He was an Englishman called Tony who came from South Africa. At last I had some company other than the faceless thousands on s.s.b.! Tony took an interest in the radio, but couldn't understand why pile-up contacts were so brief. He also took a sudden interest when I tapped out my call sign in c.w. using the PTT while trying to make myself heard on 40 meters to a station who was calling for me.

Anyway, next morning Tony and I both

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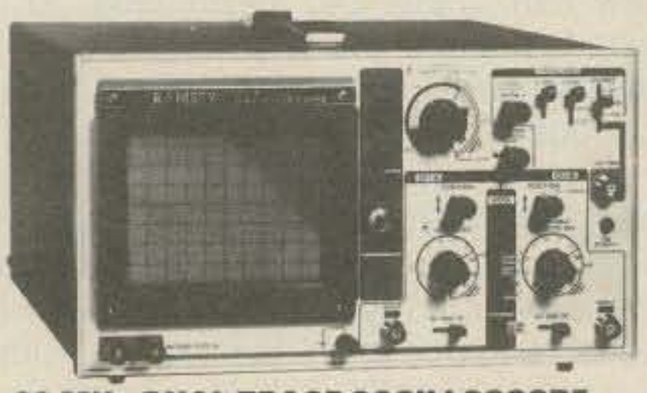

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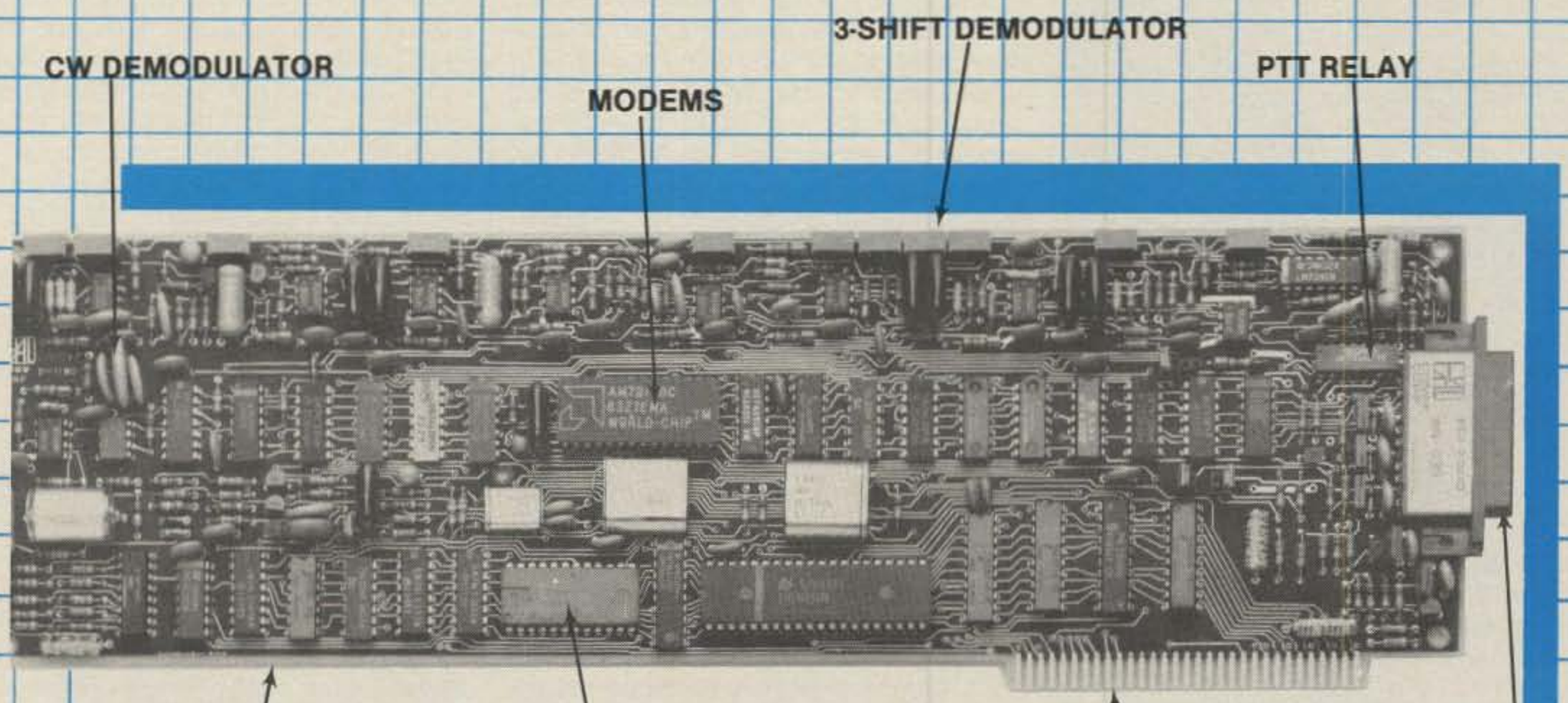

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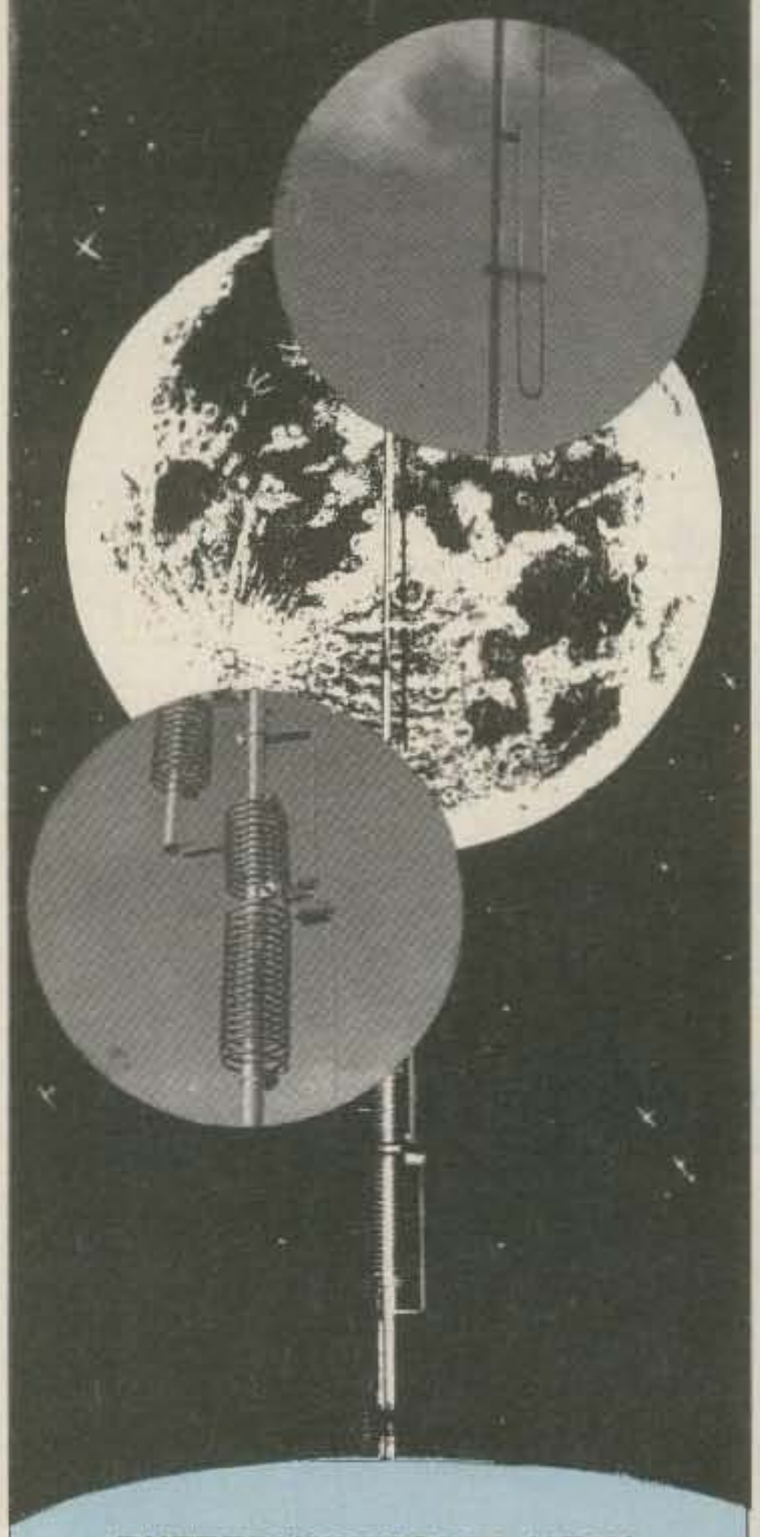

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The QSL card for the D68AAB DXpedition. The chief op looks nervous as he sits with his back to the sea.

wanted to go into Moroni, so we walked up the lane to the main road to try to find a *taxi brouge*. After about half an hour of idle chatter in the scorching sun, a jeep full of armed soldiers roared past us and turned down the lane to the hotel. "See, they've come to get you," Tony muttered. "Don't be so daft," I retorted. Five minutes later the jeep was back, and it pulled up in front of us. "*Monsieur Shepherd*?" the officer in charge asked. "*Oui, c'est moi*," I replied. At this the six soldiers in the back of the jeep jumped out and pointed their rifles at me! "Can I help you?" I asked. Tony was looking nervous. "I have orders from the President to arrest you and take you and your equipment into Moroni." "But," I protested, "I have letters of Authority and a license to operate." "The President's word countermands everyone else," replied the officer. Much to my annoyance, I was marched back to my beach hut where I collected my papers, packed up my rig, and handed it over to the Army. They even took my transistor radio!

I was driven at suicidal speed over 35 miles of bumpy road wedged in between the soldiers with their rifles thumping up and down in the back of the jeep. First stop was Army H.Q. near Moroni. I spotted the officer who had typed out my letter of authorization. He apologized and said that it was all above their level. This was a Presidential matter, and unfortunately the C in C was away on another island, as he was sure that he would have been able to help. After numerous telephone calls I was taken to the headquarters of the Secret Police. There the equipment was examined, and I was questioned for six hours. I could not get anyone to tell me exactly what I had done wrong, but it would seem that the President was not aware of my presence on the island, until perhaps one of his mercenaries, who are there to protect him, spotted the antenna and reported the fact that there was a foreigner mad enough to visit the place up on the north end of the island with radio equipment! It would seem also that although the Civil Police had been informed of my presence, the Secret Police had not, and I could not help thinking that they were taking umbrage at no being in on the act in the first place. After all, they claimed, they were as responsible for the security of the island as the Army. Perhaps it was just as well that they had not been told, I reflected, for I might have found myself here a lot sooner!

One of the high points of the interrogation was when the Police chief asked just who I had spoken to on this radio? "Well," I replied, "I can't remember them all. As of this morning, some 2760 different people!" He went pale and nearly fell off his chair! "On the island?" he asked. "No, no," I replied, "all over the world. In fact, this morning I was talking to America." (I thought it best not to mention Russia under these circumstances!) He was speechless. The soldiers got down on their knees, admiring the rig which was on the floor, their eyes bulging in disbelief. "How can it be so strong?" they asked. It was obvious to me that I was a loser here, and apart from making observations such as "Mrs. Thatcher will not be pleased when she hears of today," I had to simply refrain from striking out at those around me who obviously never heard of amateur radio, and accept that in their eyes I was public enemy number one!

After consultation with the Prime Minister and the Minister of the Interior, it was decided that I should leave the island on the next day's plane, and until then, my equipment would remain in their possession. At 6:30 that night I was turned out into the streets of Moroni, and was immediately set upon by the mosquitos. No petrol, no taxis, and 35 miles from my hotel.

After much protesting to the Army about being brought here against my will, I eventually persuaded them to drive me back to Malouga.

Tony was waiting with dinner ready. "Don't ask me how, but I knew you would be back. You don't know how lucky you have been." "But I haven't done anything wrong," I protested. "Ian," he replied, "the trouble with you is that you do not know the way of the islands. You are very lucky to be here tonight. Many people have rotted to death in island prisons for far less." I still didn't agree that it was right. Four bottles of wine later I staggered back to my beach hut full of sorrow that there would be no more D68 QSOs, and collapsed on my bed.

Next morning I started to take down my antennas and pack up. A very attractive Comorian girl came and sat down on the beach near me. She smiled and beckoned me over. "What happened yesterday?" she asked. "Happened?" I asked. "How do you know about it?" "The whole island is talking about you," she replied. "I, too, would like to see the government brought down. You are our friend!" "Oh no!" I groaned, and then proceeded at great lengths to try to explain amateur radio! She in turn explained the political situation in the Comoros, and it would appear that there is notable opposition to the President, who lives in fear of a possible coup d'etat. The rest of the morning was spent in the company of this alluring girl, and it was nice to know that I had a friend on the island other than Alain, who was stranded 35 miles away due to the lack of petrol, and who could not take me to the airport.

I went up to the barman, who had treated me with an air of great suspicion. "Make sure that my bill is ready by noon," I said, "as the submarine will be off the beach at 12:30 to collect me!" He went a shade nearer white and almost choked! "I suppose you will be glad when I have gone?" "Yes," he replied.

Well, it took all of two hours to find a taxi that had any fuel left, and I arrived at the airport an hour late. However, much to my relief the Secret Police were still waiting with my equipment. As I walked out to the aircraft, I turned and looked around at the balcony of people. There amongst the crowd was Tony! He gave a small wave of the hand. Who on earth was he really?

I heaved a huge sigh of relief as we left the ground, the silhouette of the Kartala in the sunset on my left. Quickly it was gone, and I pressed the call button for my first bottle of champagne.

I arrived at Heathrow some 18 hours later after delays due to striking Italian air-traffic controllers, and yes, you've guessed it, my baggage didn't arrive with me! The airline assured me that it would be on the next flight from Paris two hours later, so I sat down and chatted with the customs officers until my bags appeared. When I came to clear customs, I asked them if they wanted to see my radio equipment. "No, mate," one of them said. "Sounds to me like you have had enough!"

An hour later I was home, but I could not sleep. I had to get back on the air. Hurriedly I reconnected the rig, swung the KLM southwards, and tuned up the SB-220. "CQ DX, G4LJF calling CQ DX." I released the PTT, bracing myself for the pile-up. Nothing, absolutely nothing save the occasional static. I tried again, and again, with no takers. Perhaps the rig was damaged? No, the reality was that I was now just another G station.

Disgustedly I switched off and stared glumly at the world prefix map. The memories came flooding back. The pile-ups from all over the world, the soldiers, the girl on the beach, and even the large rat that stole a mouthful of chips off my plate and then scampered up the wall with them sticking out of its mouth like huge yellow whiskers! Perhaps the Comoros was not such a bad place after all, I thought. At least I managed to work 116 countries before I was silenced. But I wondered if any other visiting amateurs would get the chance to operate from there in future? Perhaps I'll go back after the coup!

My eyes returned to the prefix map. Where to next, I wondered? Now how about KH1? Now there's a thought . . .!

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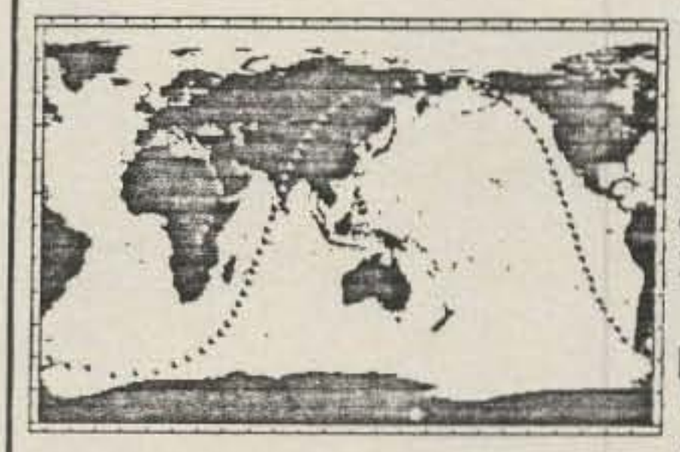

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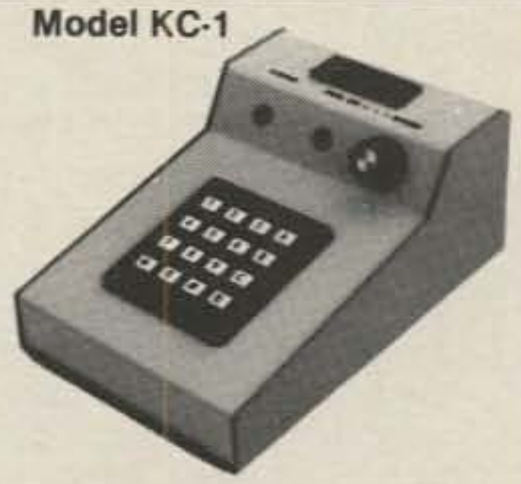

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Those Old Novice Days
Build A 40 Meter Tube Transmitter

BY CHRIS HUNTLEY*, KX0Y

The tube has been a part of radio for a long time. To build a tube-type transmitter in 1984 may seem foolish, but not to me. This article is intended to bring a missing challenge back into amateur radio.

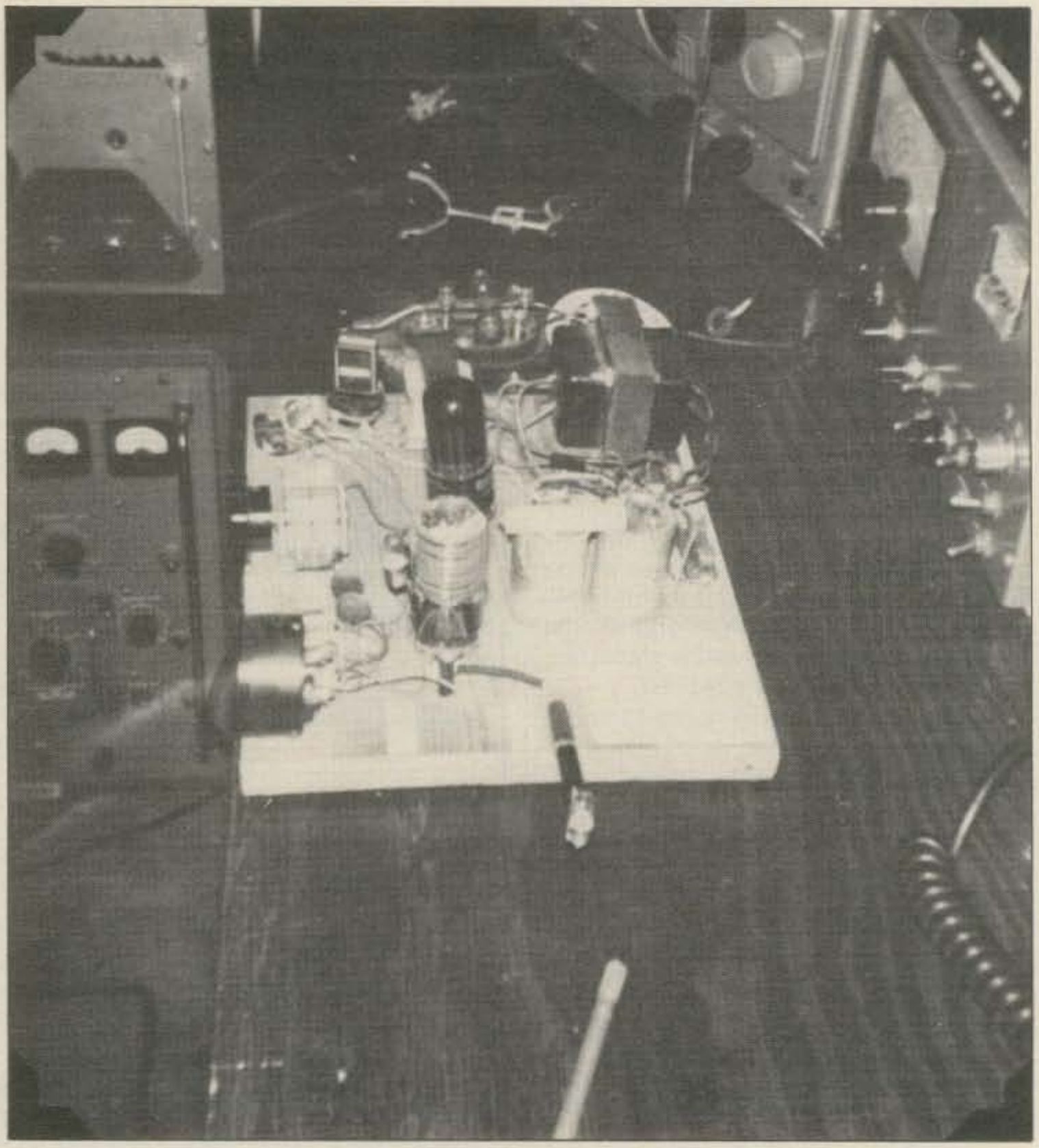
Tubes have always been a puzzle to me. Being 20 years old, most of the projects I've built have used transistors. It seems that my attitude towards tubes has been somewhat negative. All of those wires, big transformers, and high voltages just put a damper on my project ideas. But after reading through some old handbooks and some *CQ*'s and *QST*'s, I began to understand tubes.

Now that I had all of this new knowledge, I wanted to build something. A simple transmitter seemed to be the perfect choice. After digging through many musty pages, I found the typical single-tube transmitter. It's a low-power crystal-controlled oscillator.

This circuit is very popular and foolproof. A weekend and a handful of parts are all that is needed. None of the parts are critical and all can be substituted. The trick here is to grab an old junk tube radio and gut it. Try not to buy anything new unless you have to.

The transmitter is built on a 12" × 12" piece of pine. I chose this wood since it is soft and easy to work with. The parts layout is not too critical, but a few common practices should be exercised. Keep all leads as short as possible (TVI), and be aware of wires carrying high voltage.

The power supply is very simple. Any transformer with a secondary from 120–200 v.a.c. will work. Two 6.3 volt filament transformers could be used back to back, which would give about 160 v.d.c. The rectifier is four 1N4005's in bridge fashion. It is also possible to use a voltage doubler circuit using two diodes and two capacitors. This way a secondary voltage of 125 v.a.c. would yield about 210 v.d.c. (key down). The electrolytic is the metal-can type and should be rated at 350 w.v.d.c. or more.



Close-up of the "breadboard" transmitter.

Terminal strips were used throughout this rig; a pack of five is under a dollar. These were the only things I bought new. The variable capacitor is the miniature type found in pocket radios or the larger version used in table sets. The tube used

*94 Walnut St., Albion, PA 16401

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The little gem at the operating position. It looks as if KX0Y believes in home-brew.

in this rig can be any of the following: 6F6, 6K6, 6V6, or the 6L6. These tubes can be found in most old BC sets. They were the audio amplifier, and all have a 6.3 volt filament. The #40 bulb in the crystal circuit monitors the crystal current. In normal operation this bulb should be glowing at about one-fourth its normal brightness. The coil L1 is wound on the ever-popular toilet-paper tube. L2 is wound directly below L1. In my version I used an old regulator tube as the coil form. The leads from L2 go directly to the antenna jack. I used a mini-jack, but an SO-239 would work just as well. A #40 bulb in series with the B-plus line is used as the plate current monitor. In my version I used an old 0–200 ma meter. A #47 bulb works great as a dummy antenna. This way you use inexpensive pilot lights as current and r.f. monitors. The crystal used can be any 7 MHz fundamental type. I used a spare tube socket as the crystal socket. Another idea is to use two alligator clips soldered to a terminal strip; this way you can use just about any shape or size crystal.

With the wiring completed and checked for errors, power now can be applied. The soft orange glow of the filament should be visible. With the proper crystal in the socket, and key down, adjust C1 for minimum brightness of the #40 bulb in the B-plus line. A clear note should be heard in the receiver. If not, turn C1 to either side of the current dip. If you have a.c. in your signal, check the electrolytic in the power supply.

My first contact was with an amateur in Boston. He was quite surprised when I told him about the 3 watt powerhouse. The QSO's are always fun, especially when you describe the little transmitter to the other fellow. My best DX has been France using a very plain vertical antenna. Enjoy and relive those old Novice days. CQ

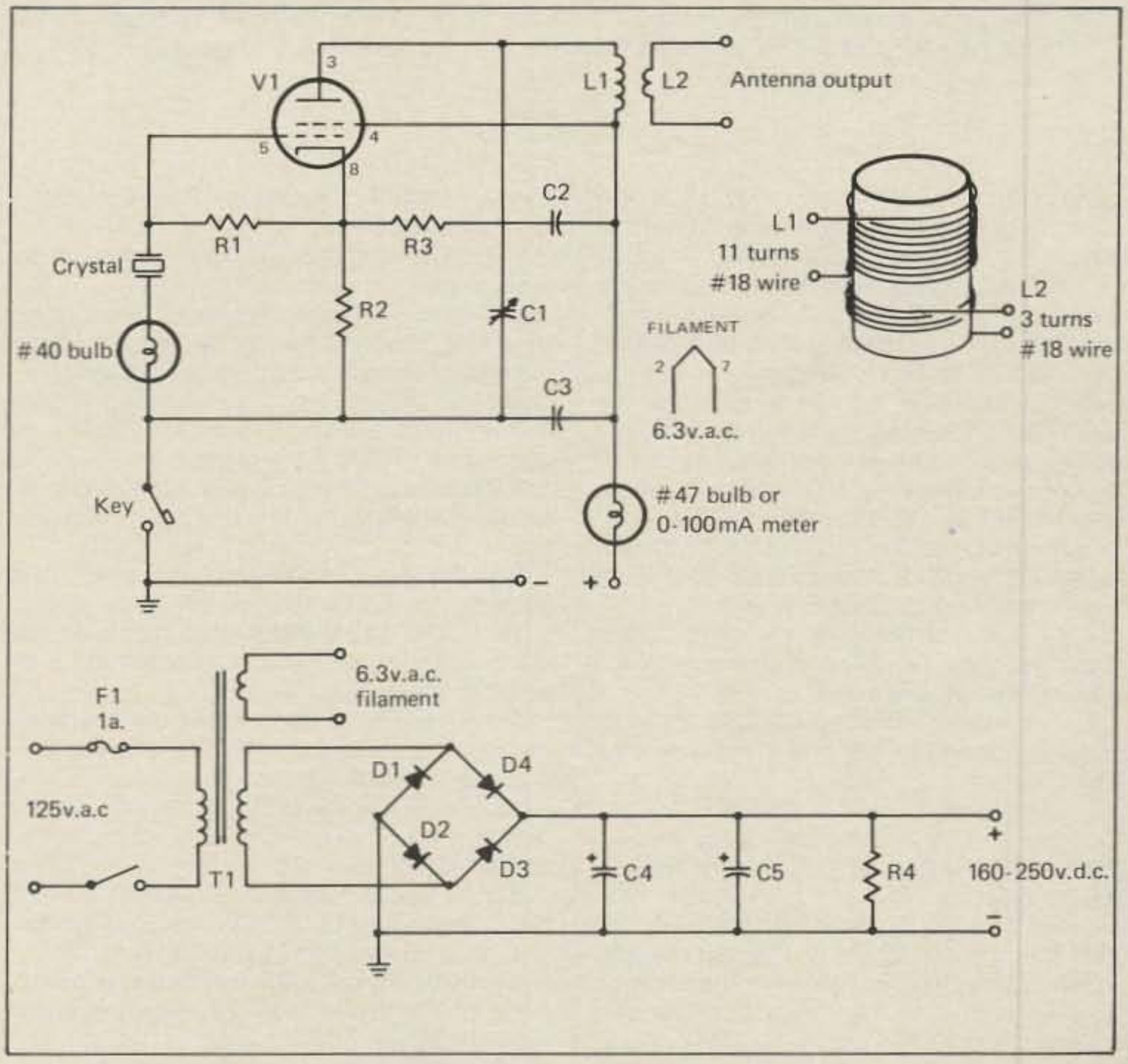

Fig. 1– Schematic diagram for the one-tube 40 meter transmitter.

Parts List

T1: old BC xfmr 125–250 v.a.c. secondary
C1: 365 pF variable (old BC set)
C2, C3: .02 mF 400 v.d.c.
C4, C5: dual section electrolytic 20 mF 450 v.d.c.
R1: 100k ½w
R2: 330 ohms 2w
R3: 470 ohms ½w
R4: 20k 5w
D1,2,3,4: 1N4005
F1: 1 amp fuse
S1: any type of s.p.s.t. switch
L1: 11 turns #18
L2: 3 turns #18
Xtal: any 7 MHz fundamental (write to CW Crystals, Marshfield, MO 65706)
V1: 6F6, 6K6, 6V6, or 6L6

CQ REVIEWS:

The Yaesu FT-980 CAT

BY JOHN J. SCHULTZ*, W4FA

The FT-980 is a very heavy-duty, full-featured base-station transceiver. It has about every operating feature one could imagine in an h.f. transceiver with general-coverage receive. However, it is a lot more than a transceiver with various "bells and whistles." It is one of the "new generation" of transceivers slowly emerging on the market which have all of their major functions controlled by an internal microcomputer. Therefore, one can use the transceiver in a conventional sense by turning knobs and pushing buttons, or one can control it from a personal computer. In the latter case, one can control the transceiver by keyboard commands or develop a program which will command the transceiver to do certain operations in certain sequences, at certain times, or in response to certain received signals. Does one need all of these capabilities in a transceiver? Well, one has to decide that for one's self. I would suggest, however, that an operator who even only enjoys ragchewing on 75 meters not say no too quickly. Convenience features in a transceiver, once they are understood, really do make amateur radio operating more interesting.

This review will give a general description of the FT-980 and its overall circuitry and construction; highlight interesting circuit features; provide test-bench results; and convey operating impressions and results using the transceiver in the usual "turning the knobs and pushing the buttons" fashion. In a subsequent article we will provide a more technical overview of how the FT-980 can be interfaced with a personal computer.

The FT-980 almost appears small here as it has stacked upon it the SP-980 optional speaker and a Yaesu FTV-707 transverter which can be used with the FT-980 for 2 meter coverage.

Specifications

Table I lists the specifications for the FT-980 as supplied by the manufacturer. They deserve a bit of time for study. One might note, first of all, that the FT-980 is not a paperweight unit. It weighs some 37 pounds and measures overall some 15 inches wide by 6½ inches high by 18 inches deep, including its internal power supply. It is a very impressive unit as seen in an operating position. The styling is a combination of off-gray colors with the push-buttons and knob caps being aluminum colored. The frequency display is a soft green fluorescent type and the backup lighting for the two panel meters is soft green. Yellow-bar-type LED's are used above or in association with various push-buttons to indicate an "on" status. Besides the main digital frequency display, there is also a unique digital/analog "scroll" type frequency display directly above the main tuning knob which indicates from 000 to 950 in steps of 50. At first I thought it to be a bit of "decoration." But after many hours of using the transceiver, I completely changed my mind. Also, after many hours of using the transceiver, I must say that I found the subdued color styling extremely easy on the eyes.

Going back to Table I, and if one wishes to study the "numbers," it can be seen that the FT-980 has completely state-of-the-art specifications with regard to spurious responses, sensitivity, selectivity, IMD, dynamic range, image rejection, etc. However, the specifications themselves do not highlight a number of interesting features of the FT-980. Among the more interesting features are:

1. An 8-bit microprocessor control system which includes 12 memory channels which store frequency and mode.

2. Two independent v.f.o.'s, one for amateur band coverage and one for general-coverage receive.

3. Tuning of the v.f.o.'s and the memory channels by use of the main tuning dial, up/down scanning (dual speed) buttons, or keypad frequency entry.

4. Split-frequency operation between the v.f.o.'s and a memory channel (the memory channel being used for receive or transmit, depending on whether the amateur band or general-coverage v.f.o. is used, since the general-coverage v.f.o. *cannot* be used for transmit). Full transceive operation is possible on any memory channel that stores a frequency within an amateur band.

5. Full QSK within any band and crossband/crossmode operation.

6. TX and RX tunable frequency offset up to ± 10 kHz. The main frequency display follows the offset tuning to indicate true operating frequency.

7. Internal reference oscillator stability of ± 3 Ppm from 0 to 40 degrees C.

8. Digital frequency display has selectable resolution of 100 or 10 Hz and a dimmer control.

9. Independent receiver "front-ends" for amateur band or general-coverage receive.

10. **IF Shift** and **IF Width** adjustments on receive along with separate a.f. notching and peaking filters.

11. R.f. speech processing on transmit with microphone audio squelch and i.f. monitor circuit to adjust processing.

12. Complete metering to include s.w.r., power output, a.l.c. (normal or peak hold), compression, etc.

13. All modes standard with a nominal 100 watts output on s.s.b. and c.w., 25 watts on a.m., and 50 watts on f.m. and FSK.

14. Up to 75% of full power output at a load s.w.r. of 1:3 (depending on the reactive components present in the load).

15. Some options are available, but the FT-980 is basically a complete station. Only an

*c/o CQ magazine

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TRANSMITTER

Frequency range:

160 m band	1.5 to 1.99999 MHz
80 m band	3.5 to 3.99999 MHz
40 m band	7.0 to 7.49999 MHz
30 m band	10.0 to 10.49999 MHz
20 m band	14.0 to 14.49999 MHz
17 m band	18.0 to 18.49999 MHz
15 m band	21.0 to 21.49999 MHz
12 m band	24.5 to 24.99999 MHz
10 m band	28.0 to 29.99999 MHz

Tuning steps:
10 Hz, 5 kHz and 500 kHz (band step)

Emission types:
LSB, USB (A3J/J3E*), CW (A1/A1A*), AM (A3/A3E*), AFSK (F1/J1B*), FM (F3/F3E*)
* New emission designation per WARC '79

Power output:

	(all bands)
SSB, CW	100 W (PEP)
AM	25 W
FM, FSK	50 W

Carrier suppression:
better than 40 dB below peak output

Unwanted side band suppression:
better than 50 dB below peak output (1 kHz tone)

Spurious radiation:
better than 50 dB below peak output

Audio response:
better than −6 dB from 250 Hz to 2750 Hz

3rd order intermodulation distortion:
better than −40 dB below peak output (14 MHz, 100 W)

Frequency accuracy:
better than ±3 ppm from 0–40°C

Modulation type:
A3J, AFSK: Balanced Modulator
A3: Low Level Modulation
F3: Variable Reactance

Maximum FM deviation:
±5 kHz

AFSK shift frequencies:
170, 425, 850 Hz

Output impedance:
50 ohms(nominal), unbalanced

Microphone impedance:
Low (500 to 600 ohms)

RECEIVER

Frequency range:
150 kHz to 29.9999 MHz (continuous)

Circuit type:
Triple conversion superheterodyne

Clarifier range:
±10 kHz

Sensitivity:
(CW, SSB, and AM figures measured for 10 dB S+N/N)
* 2 to 30 MHz ** 150 kHz to 2 MHz
SSB/FSK/CW(W; w/out options)
* better than 0.25 μV, ** better than 4.0 μV
CW(N)
(with optional XF-455.8MCN 300 Hz filter installed)
* better than 0.1 μV, ** better than 1.6 μV
CW(W)
(with optional XF-8.9HC filter installed)
* better than 0.16 μV, ** better than 2.6 μV
AM(W)
* better than 1.4 μV, ** better than 22 μV
AM(W)
(with optional XF-8.9GA filter installed)
* better than 1.25 μV, ** better than 20 μV
AM(N)
* better than 1.0 μV, ** better than 16 μV
FM
better than 0.6 μV for 12 dB SINAD

Intermediate frequencies:

1st IF:	47.055 MHz
2nd IF:	8.9875 MHz
3rd IF:	455 kHz
FM IF:	455 kHz

Image rejection:
better than 70 dB

IF rejection:
better than 70 dB for all frequencies

Selectivity (adjusted for maximum IF width):

	−6 dB	−60 dB
SSB, CW (W/N), FSK	2.5 kHz	4.2 kHz
CW(N)*	300 Hz	600 Hz
CW(W)*	600 Hz	1.2 kHz
AM(W)	6 kHz	17 kHz
AM(W)*	5 kHz	12 kHz
AM(N)	3 kHz	9 kHz
FM*	12 kHz	24 kHz

* with optional filter installed

NOTE: These figures apply as maximum bandwidths with Width control set to maximum.

Dynamic range: (at maximum sensitivity)
better than 95 dB with optional 300 Hz CW(N) filter

Audio peak filter range:
350–1400 Hz

IF notch filter range (demodulated):
500–2700 Hz

Audio output power:
3-watts minimum (into 4 ohms, with less than 10% THD)

Audio output impedance:
4 to 16 ohms

POWER REQUIREMENTS

Voltage:
AC: 100 to 120 V, or 200 to 234 V; 50 to 60 Hz

Power consumption:	AC
Receiver	72 VA
Transmit (100 W output)	530 VA

Dimensions (WHD):
approximately 370 mm x 157 mm x 350 mm; 380 mm x 165 mm x 465 mm with all feet, knobs and heatsink

Weight:
approximately 17 kg.

Table I– Technical specifications for the FT-980 as supplied by Yaesu.

a.c. connection, antenna connection, and microphone and/or keyer are needed to operate.

Circuitry

The FT-980 incorporates a complex mix of digital and analog circuit techniques. It would be fun to describe and analyze all of them, but it would take a small book to do so. I think, however, that a basic circuit overview and the highlighting of a few circuit details would be interesting.

Fig. 1 is a block diagram of the FT-980. Such diagrams do, I agree, seem to be overwhelming with all their blocks, but they can provide some interesting insights into the circuitry concepts used in different transceivers. The "front-end" of the FT-980 (upper right of fig. 1) shows, for instance, how the incoming signal on receive goes through a fixed low-pass filter assembly, but then splits, depending upon whether the transceiver is being used in the amateur band or general-coverage mode. In the general-coverage mode the signal goes on to a bandpass filter block (one of six diode-switched filters) and then on to a dual FET r.f. amplifier stage (Q1005,6). In the amateur band mode the signal is routed through a fixed highpass filter, on through one of twelve (!) diode-switched bandpass filters, and then to r.f. amplifier stage Q1007,8, which is also of the dual FET variety. Fig. 2 shows a bit of the elaborate "front-end" circuitry in the FT-980. In either case, the now amplified receive signal goes on to the first mixer stage Q1009. The signal then goes on to a number of frequency translations which involve 47.055 MHz, 8.9875 MHz, and 455 kHz i.f.'s. One can follow this from right to left across the top of fig. 1. The demodulated signal then goes through an elaborate series of filtering and amplifier stages. It's interesting to note that the a.p.f. (audio peaking filter) operates, just as its name states, at audio frequencies (stage Q3026½). However, the notch filter (stage Q2006,07 labeled Q MULT) operates at the 455 kHz i.f. frequency and is a modern-day version of the 20-year-old "Q Multiplier" which, of course, originally used vacuum tubes. The detailed circuitry is shown in fig. 3.

In the transmit mode the s.s.b. signal is generated at the 8.9875 MHz i.f. frequency. The signal chain can be fairly well followed from the microphone amplifier stage (Q3001) to a balanced mixer stage (Q3009) and then via the dashed signal-flow lines in and out of the 8.9875 MHz filter block. Perhaps the most interesting thing about the transmit signal chain flow is to observe how it is routed in and out of various i.f. filter blocks common to the receive signal chain, but completely separate mixer stages are used for the transmit signal until it gets to its final output frequency. The circuitry necessary to do this makes things a bit more

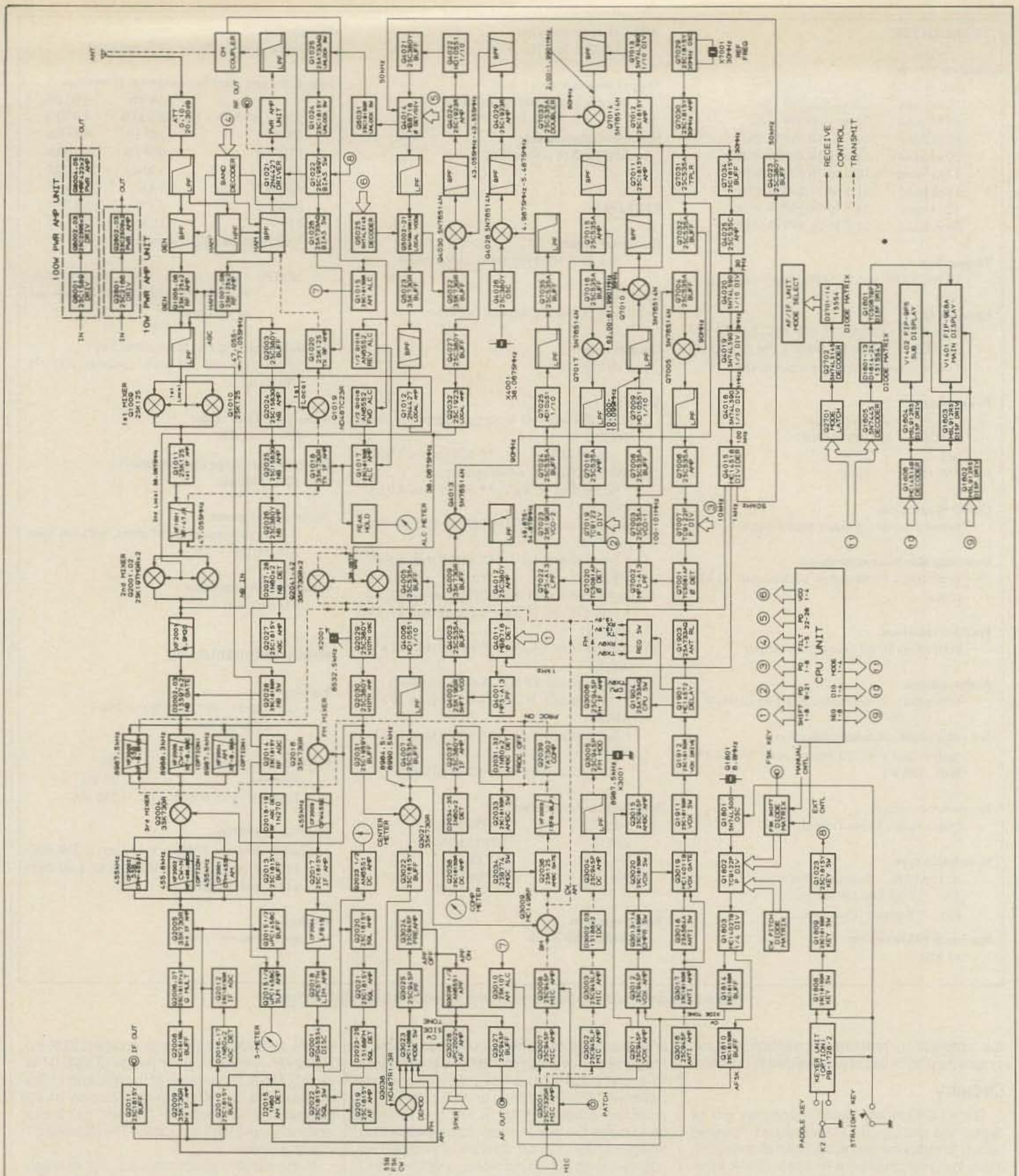

Fig. 1– Complete block diagram of the FT-980.

elaborate, but some of the compromises involved in using common mixer stages for the transmit and receive signal flows are avoided. The transmit signal, at the final output frequency, goes through one of the twelve bandpass filters associated with the receive chain and then on to a power amplifier unit. The latter operates with a supply voltage of 24 volts and utilizes two MRF 422 power transistors. Finally, the 100 watt output level signal is routed through one out of seven relay-switched low-pass filters. Transmit/receive antenna switching is done by a relay in the low-pass filter section, and there are provisions for the use of separate transmit/receive antennas as well as an external receiver.

The rest of the blocks in fig. 1 are concerned with a variety of oscillator signal generation and control functions. Fig. 4 gives one some idea of the frequency relationships in the FT-980. In this diagram the r.f. signal chain for the receive and transmit modes is shown in abbreviated form in the upper part of the diagram. Most of the diagram shows how various voltage-controlled oscillators are used to supply the injection frequencies for all of the mixers in the r.f. chain (down to the product detec-

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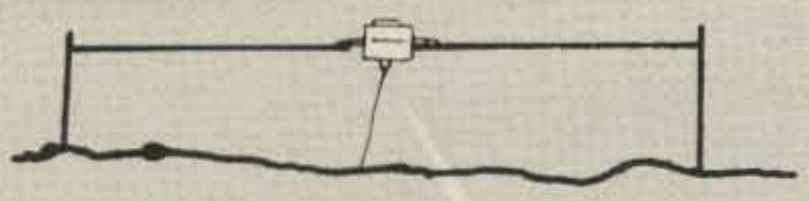

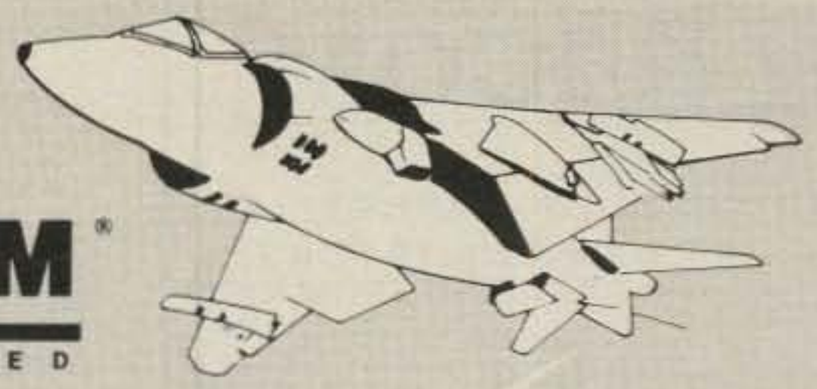

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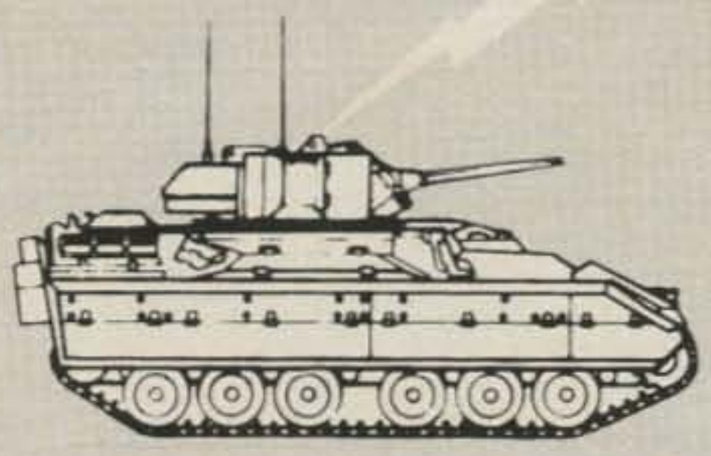

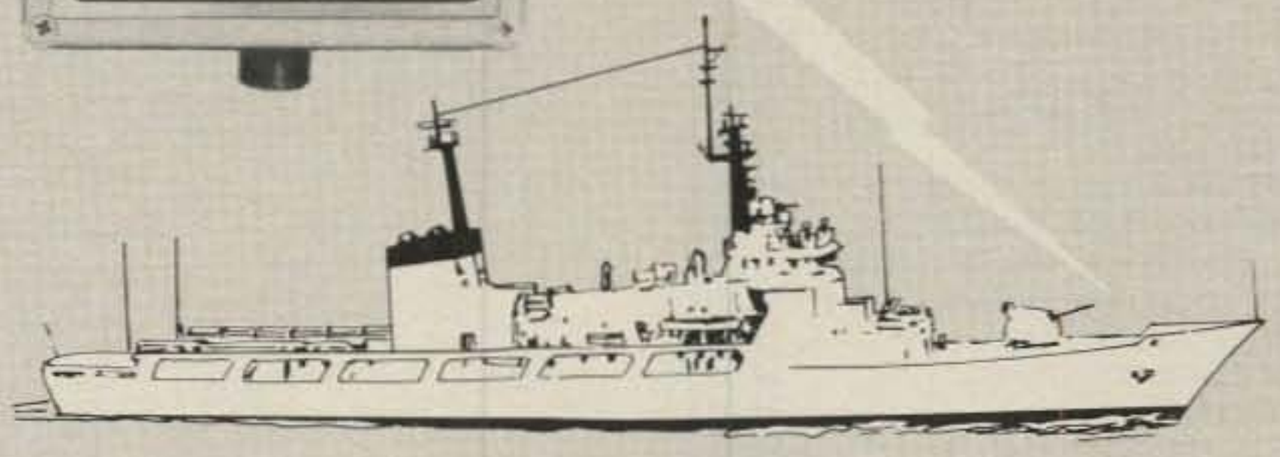

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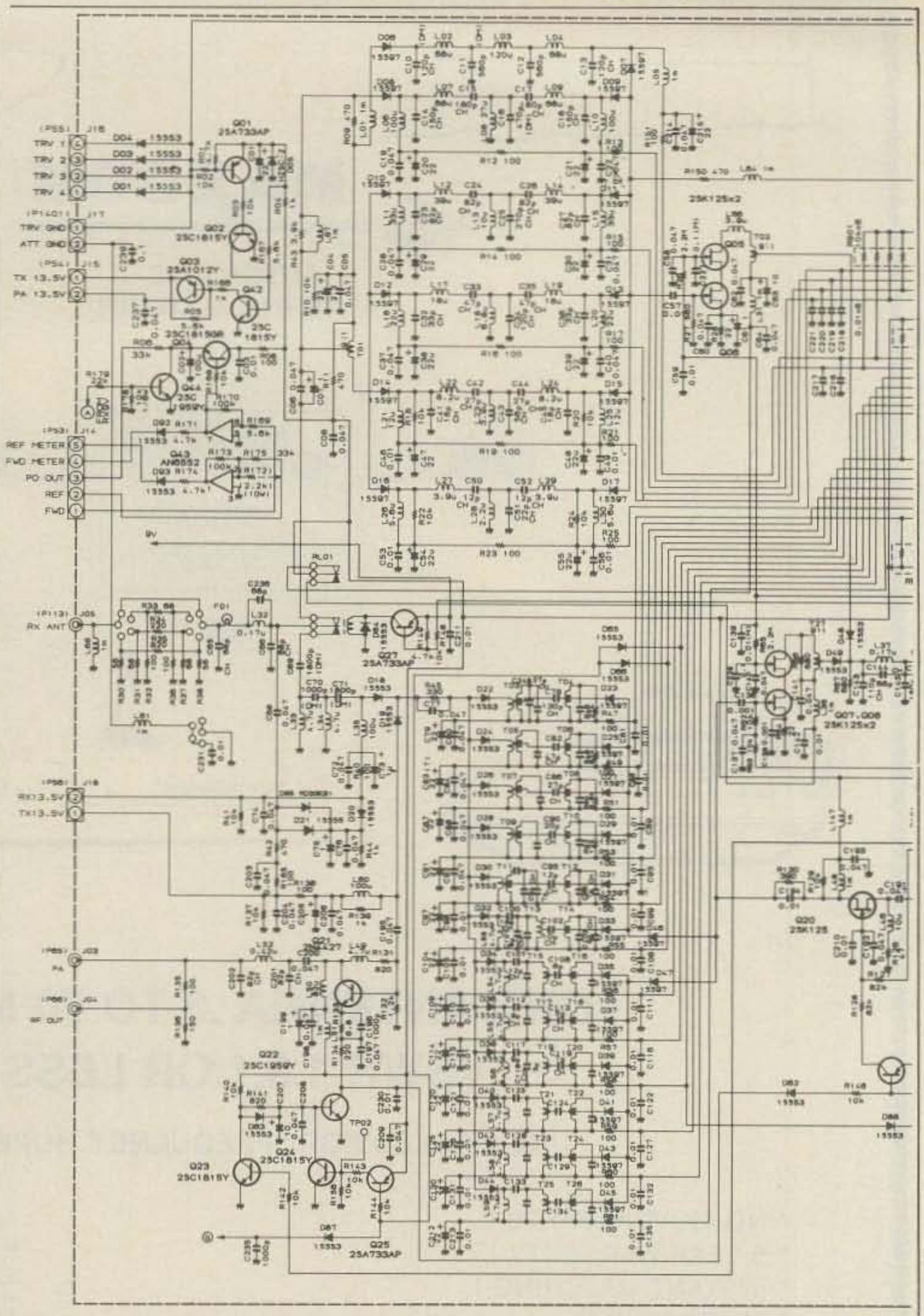

Fig. 2– Part of the "front end" in the FT-980 showing the separate input filter and r.f. amplifier stages used for the general-coverage and amateur band modes. Q05 and Q06 with their associated input filters are for general coverage, while Q07 and Q08 with their associated 12 input filters are for amateur band coverage.

tor stage). The VCO's are stabilized in PLL circuitry, and the PLL circuitry is all locked back to a 30 MHz master oscillator by means of various frequency divider and multiplier circuits coupled to that oscillator. The complexity of the real circuitry is only hinted at by the blocks shown in fig. 4. Some of the blocks labeled "VCO" contain, in fact, up to ten separate VCO's to cover different frequency ranges. The 30 MHz master oscillator is contained in a thermally controlled enclosure that only a few years ago would only have been found in laboratory-grade test equipment. There is an elaborate use of LC filters to prevent spurious signals from causing oscillator noise and interaction problems.

Construction

As was mentioned, the FT-980 is not a lightweight unit, but the weight is all due to its very solid construction. The photograph showing the FT-980 with its top cover removed only hints at some of the elaborate shielding used inside the unit. Separate shielding and heavy heatsinks are used for the PA and power-supply sections. All of the PC boards have connectors, and although they are not of the plug-in type, they all can be accessed and relatively easily removed should servicing ever be required. The construction can only be described as extremely heavy-duty, neat, and orderly.

The back panel of the FT-980 contains enough auxiliary connectors for about every conceivable interconnection-linear amplifier, transverter, phone-patch, computer control, external receiver, i.f. output, etc. There are also slide switches to change the FSK shift (170, 425, or 850 Hz) and the c.w. monitoring

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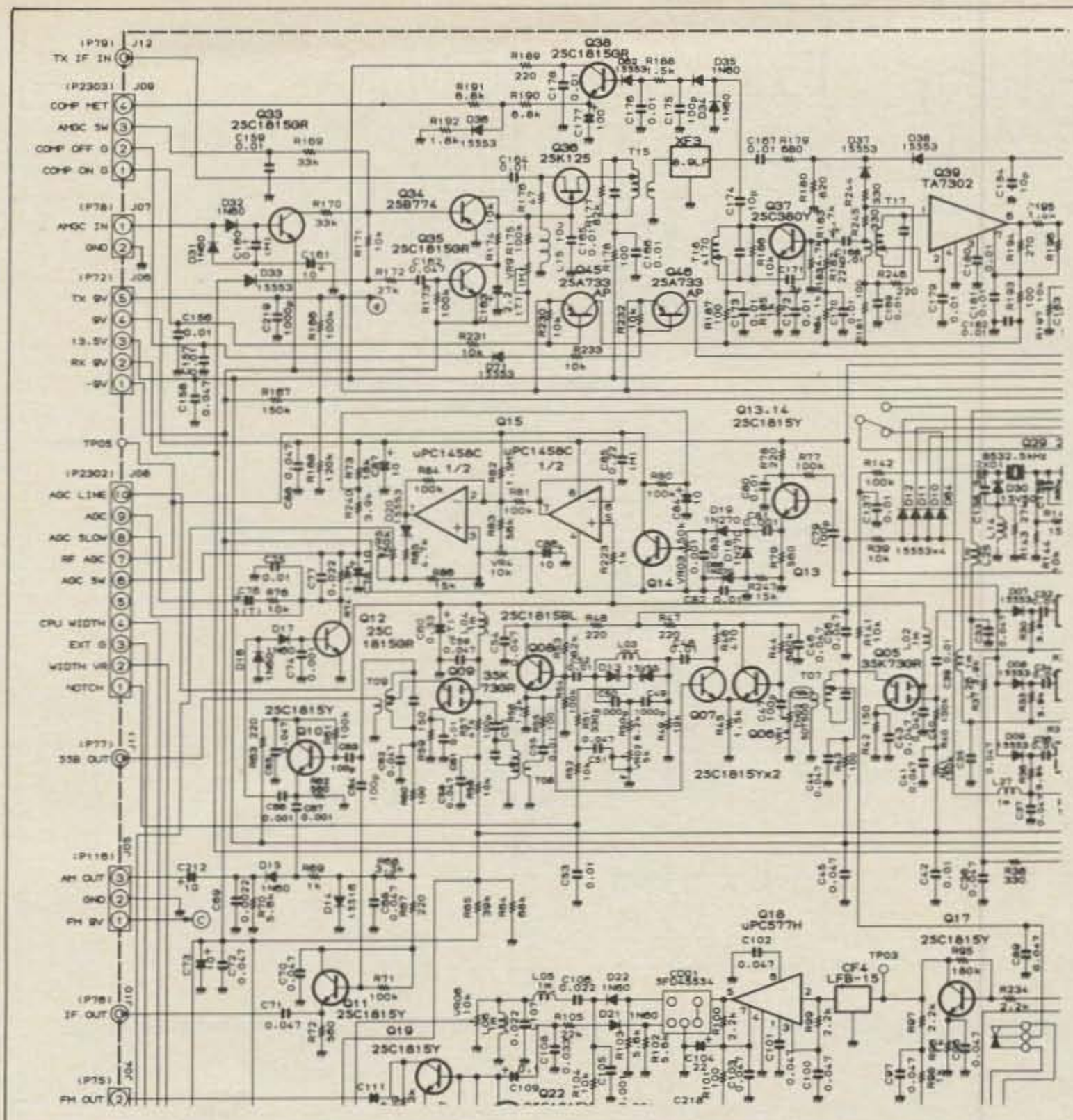


Fig. 3– The interesting 455 kHz i.f. Q Multiplier circuitry (Q 06–09 in the middle of the diagram). A modern-day version of a circuitry idea developed well over 20 years ago.

sidetone pitch (500, 600, or 700 Hz). All of the connectors are well spaced, and there is no difficulty in having a multitude of accessory connections. The only slightly awkward feature is that the access panel for the memory backup battery compartment (holding two AA-size batteries) is on the bottom cover.

Test Results

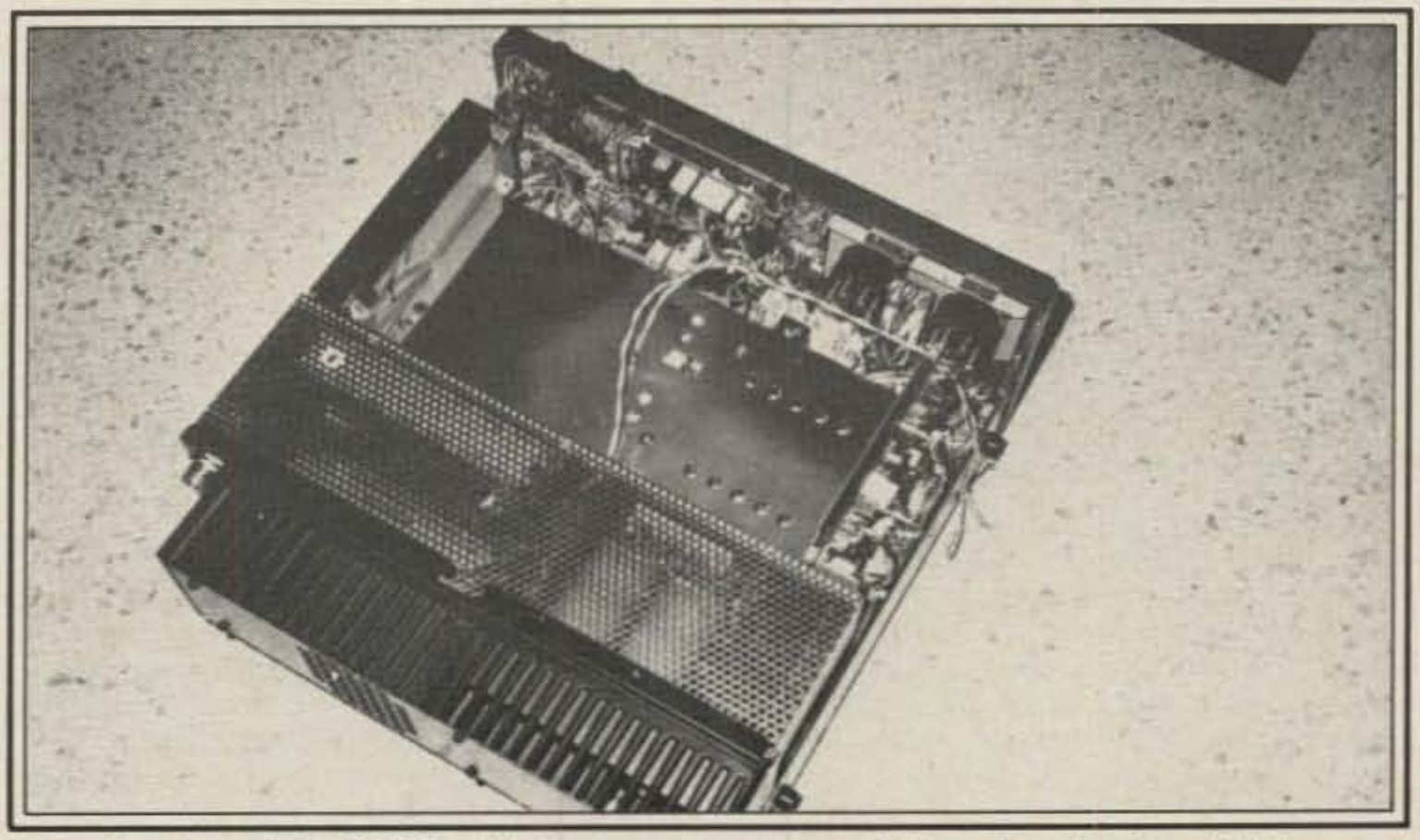
The FT-980 is a "quiet" transceiver. In spite of its elaborate digital frequency generation circuits, it is as electrically quiet as any transceiver using analog circuitry. Therefore, signals appear to rise out of a quiet background, and it's not unusual to have a weak, but well-modulated s.s.b. signal sound "loud" while the S meter does not even move, even under QRM conditions. Phase noise is at least 90–100 dB down. The only "noise" the FT-980 does produce is a slight "pop" as one goes between exact 1 MHz points in the general-receiver mode (e.g., 9.999.99 MHz to 10.000.00 MHz). It doesn't amount to much and may even be useful as a reminder that one has tuned across a full MHz point. The transient "pop" will not mask a signal that one might want to receive (e.g., on 9.999.99 MHz or 10.000.00 MHz).

The sensitivity is generally excellent and never checked out less than that shown in Table I. There is, however, a significant difference in sensitivity on 160 meters when receiving in the general-coverage or amateur band modes. Sensitivity on that band is in the order of 30 dB better in the amateur band mode. On the amateur bands the dynamic range was an excellent 90–95 dB using s.s.b. bandwidth and, of course, even better using c.w. bandwidths (measurements taken with the r.f. attenuator set at zero).

It's interesting to note that Yaesu has moved away from the push-pull type of r.f. amplifier stage as found in the FT-One. As one can see from fig. 2, both of the r.f. amplifier stages (Q05, Q06 for general coverage and Q07, Q08 for the amateur bands) are of the dual FET type, but only one FET is used as an amplifier; the other FET is used for a.g.c.

The s.s.b. selectivity varied from 2.4 kHz at – 6 dB to 4.0 kHz at – 60 dB and could be reduced to about 400 Hz using the variable bandwidth feature. The standard a.m. normal and wide filters are excellent for general-purpose SW broadcast monitoring. However, c.w. buffs will want to install at least one of the optional c.w. filters. Both were tried and checked exactly as specified. It's difficult to choose between them, but I would opt for the 600 Hz filter, since the main tuning rate is fixed at 10 kHz per knob resolution. The 600 Hz filter is easier to use with that tuning rate, and there are enough other QRM fighting controls built into the FT-980 to handle any situation. I.f. and image rejection were exceptional, measuring out at – 80 dB. No significant spurious signals could be found as the FT-980 was set up to scan through its entire receive frequency range. The fast scan rate covers about 1 MHz in 35 seconds, and in the slow scan mode about 10 kHz is covered in 40 seconds. To demonstrate the follies one can get involved in when testing equipment, I thought at first there was some funny low-frequency oscillation in the FT-980 in the 2–6 MHz range. The S meter would jump up a few S units anywhere in that frequency range about once a second. After some confusion, it turned out that I had the VOX control advanced too far, while not having the anti-VOX control adjusted properly, such that an external very low frequency audio feedback loop had been established between the station loudspeaker and microphone. Apparently the gain variations in the transceiver, although minute, were just enough to cause the effect to appear over a certain frequency range. Although one cannot transmit in the general-coverage mode, the VOX circuitry in the FT-980 remains active.

On the transmit side all the usual measurements for carrier suppression, sideband suppression, spurious radiation, etc., showed the FT-980 to be well within its specifications. The power output, into a matched load, was never less than 100 watts over any amateur band, in-



An inside view of the FT-980 with the top cover removed. There is extensive shielding used throughout.

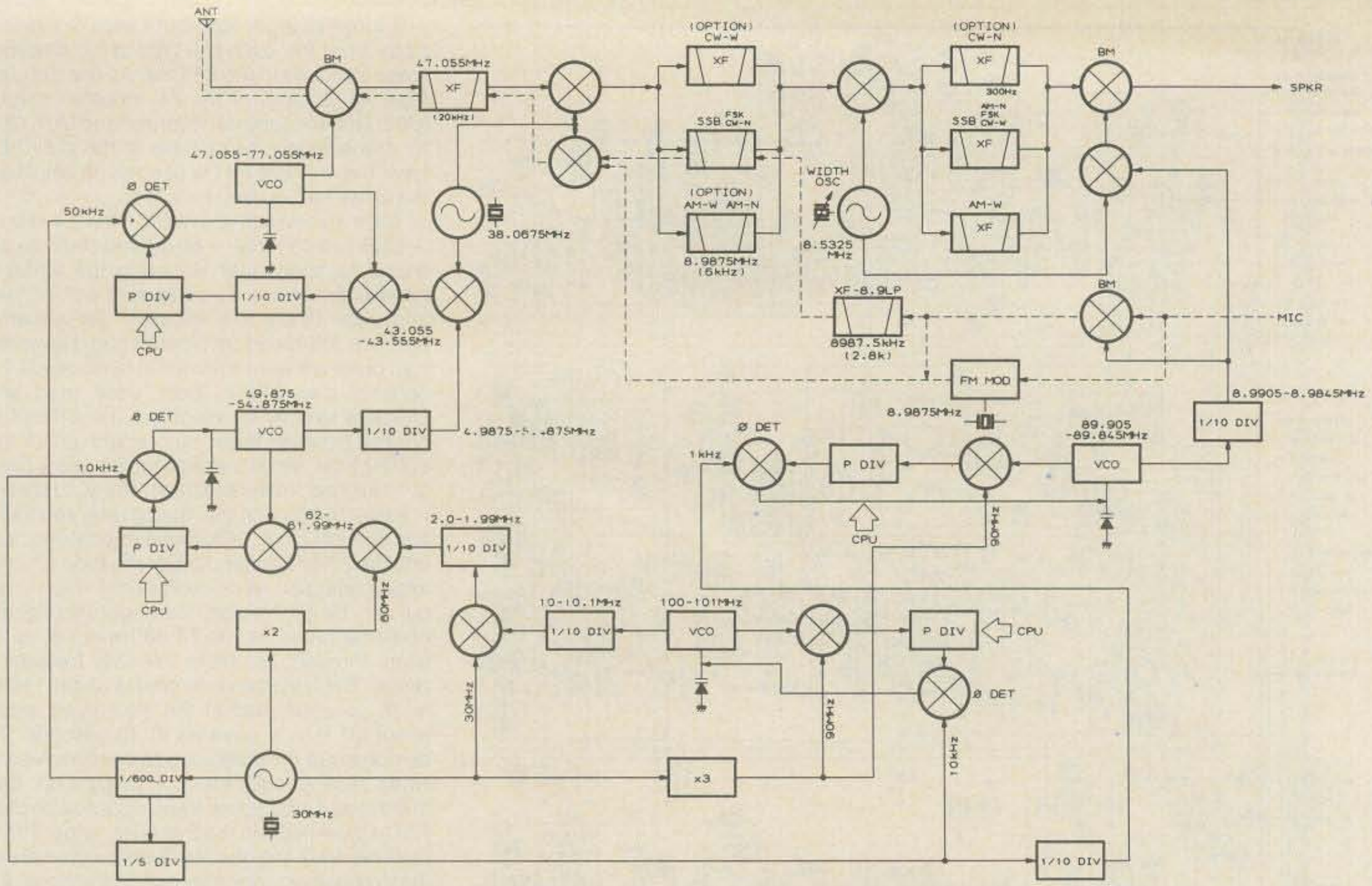


Fig. 4– Frequency relationships within the FT-980. Basic stability all relates back to the 30 MHz crystal oscillator shown in the lower left-hand corner.

cluding 10 meters. Although all of the "specs" have to be considered excellent, there are two that deserve that rare rating of outstanding. Those concern frequency stability overall and IMD products for the power amplifier. I don't have the laboratory equipment to make extremely sophisticated frequency stability measurements, so I went back to empirical methods. The FT-980 is one of the few transceivers I have encountered which could be turned on, tuned to a time standard station, left in a non-temperature-controlled environment, and found days later (not hours) to remain exactly on the tuned frequency. With regard to the power amplifier, I thought at first it was the same as in the FT-One. But although it is similar, it is not exactly the same. Twenty-four v.d.c. is used for the collector voltage on the final transistors, and those transistors have been changed to type MRF 422's rated at 280 watts dissipation each! Fig. 5 shows a diagram of the power amplifier. Measurements showed that is does indeed exhibit third-order IMD products of −40 dB, or slightly better, at 100 watts output on 14 MHz for a truly "clean" signal.

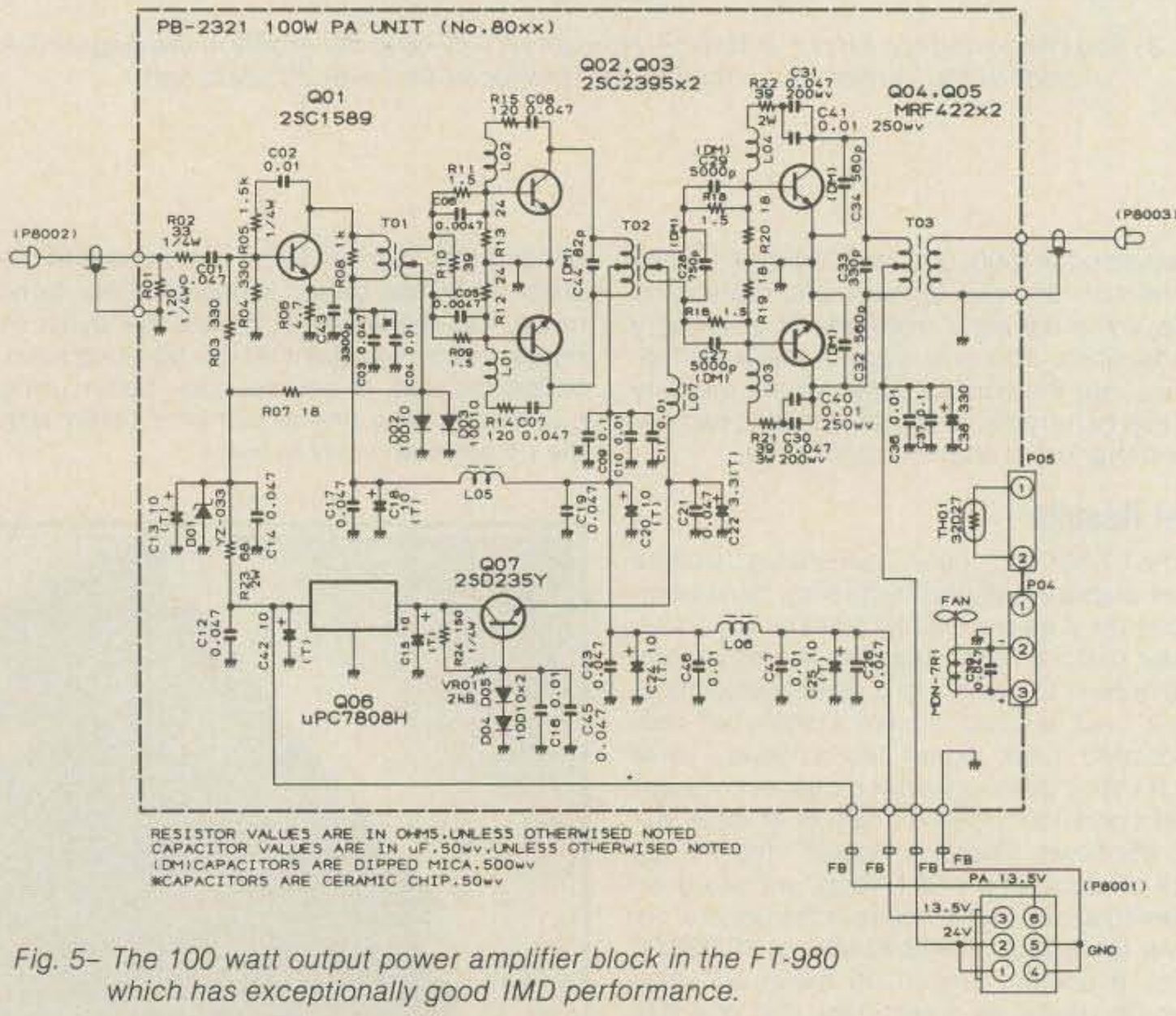


Fig. 5– The 100 watt output power amplifier block in the FT-980 which has exceptionally good IMD performance.

Operating Impressions and Results

As I have found with most new transceivers which have a variety of sophisticated features, the best way to approach the use of such a transceiver is to learn how the essential controls which allow one to basically communicate work and then slowly dig into the "bells and whistles" features. In this regard the FT-980 is very easy to operate. Press the **VFO** button (an LED lights), press the **HAM** button (another LED lights), and then tune through the band for which the transceiver is set. All of the rest of the controls that one immediately needs (AF gain, mode switch, microphone gain, etc.) are obvious and clearly marked. To change bands, the **UP** or **DOWN** pushbuttons are used. Of course, one should study the instruction manual for the FT-980 to learn the meter readings for which controls should be set. However, basic operation of the FT-980 is very simple and completely "no tune" except for the main frequency setting.

The main tuning knob has one of the smoothest actions I have encountered in years. The finger insert swivels independently to further enhance rapid rotation of the knob. One of the

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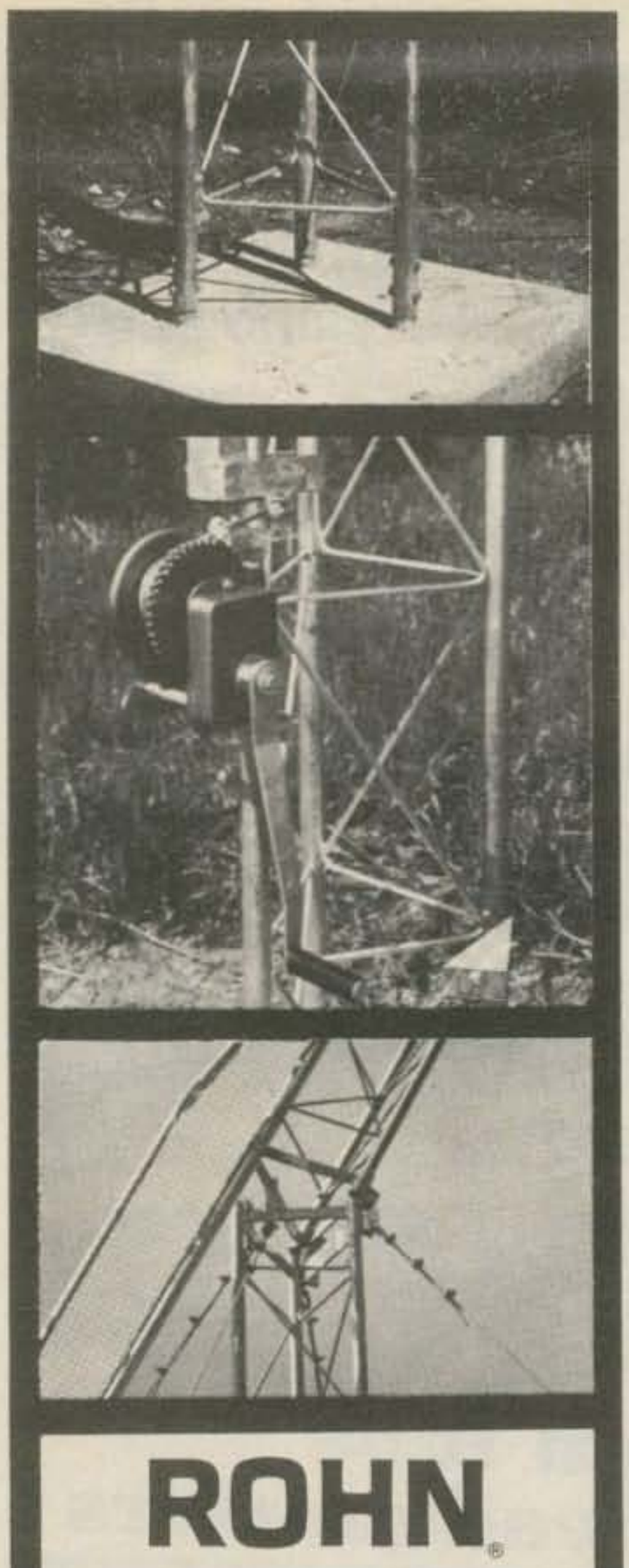

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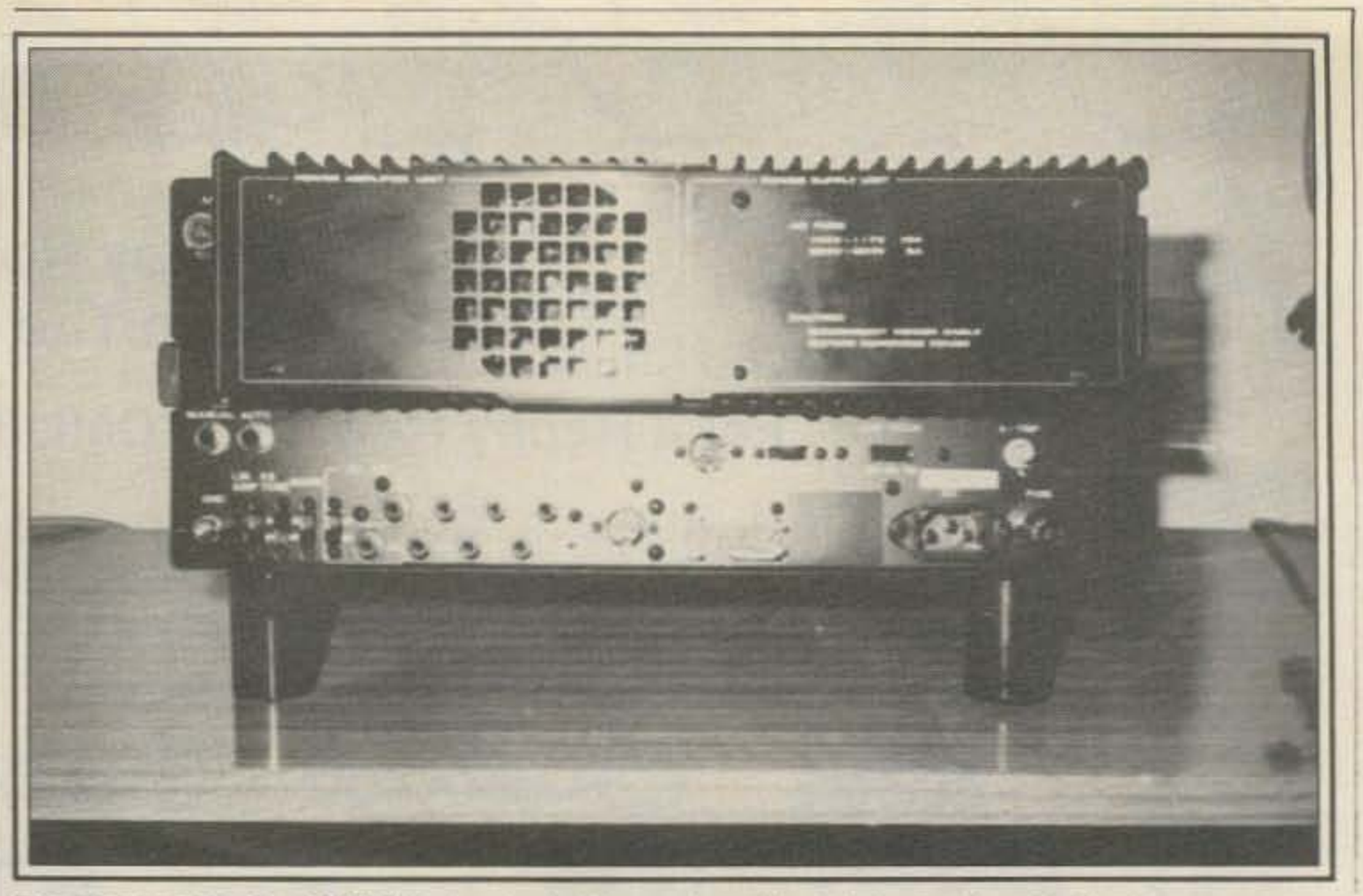
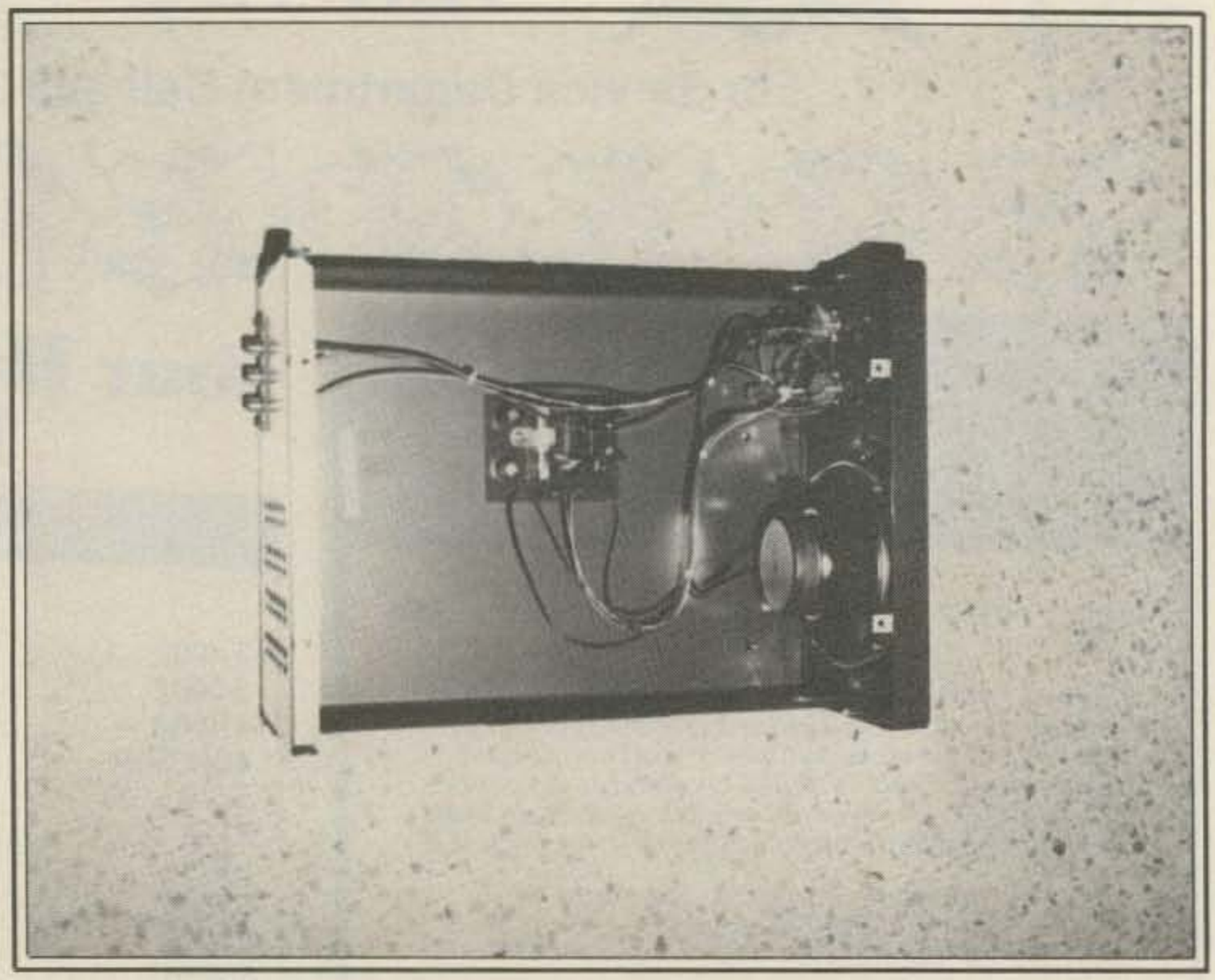


The rear panel of the FT-980 is dominated by enclosed heatsinks (on the right for the power supply and on the left for the power amplifier) plus a variety of connectors for about any possible external accessory items (e.g., linears, transverters, etc.).



An internal view of the SP-980 optional speaker. It contains front-panel selectable LC filters so one can independently roll off the low or high frequency response. The LC filter board is visible in the approximate center of the bottom cover of the SP-980.

first things one notices when tuning is the digital frequency scroll between the frequency display and the main tuning. The display is slightly confusing at first, but one rapidly appreciates that it is a very handy means to quickly establish which 50 kHz segment of a band (amateur or general coverage) one is tuning. So rather than look at the exact digital readout with its rapidly changing digits as one tunes, one can look at the much more comfortable to view digital scroll.

For instance, if one starts out at 21,050 kHz, the scroll will have the display 0--050--0 with the **5** centered in the middle of the display. As one tunes higher in frequency, an LED "dash" appears, in turn, in calibrated 1 kHz steps beneath each of the nine display positions. The frequency 21,059 kHz is indicated by the display 0--050--**0**. As one tunes another full kHz, the display jumps to 00--050--. The 050 portion of the display moves to the right of center to indicate one is above 21,060 kHz. Still further tuning causes the "dash" LED to move from left to right for upward frequency tuning or right to left for downward frequency tuning for displays such as 0--150--1 (21,150 kHz) or 050--000- (21,020 kHz) might appear. The sequence is a bit difficult to explain, since one

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must also take into account a centerline marker on the window in front of the scroll display. Fig. 6 illustrates the scroll feature in more detail. In use there is absolutely no ambiguity about which 50 kHz portion of a band one is tuning. I rarely ever looked at the main frequency display when tuning through a band except when an exact frequency was of interest. Besides using the main tuning, the FT-980 can also be tuned using the frequency scan buttons located beneath the main tuning knob or by similar buttons on a scanning-type microphone. The two scan speeds (previously mentioned) are just right for quick scan through a band or detailed tuning, even on c.w.

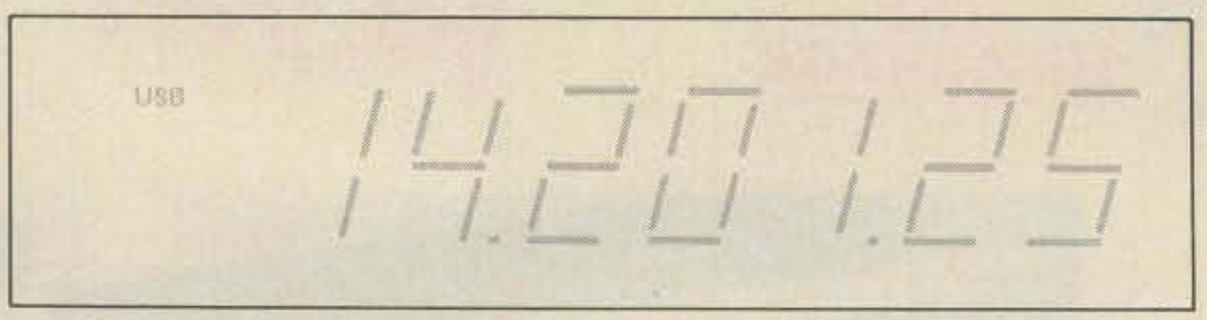
For general-coverage receive, one simply depresses the **GEN** button and tunes as before. The **UP** and **DOWN** buttons now move the received frequency in 500 kHz bands. A **REPEAT** key allows the bands to be moved continuously up or down until a desired band is reached. There is also a 5 kHz **UP** and **DOWN** key so one can scan the SW broadcast bands in 5 kHz steps, if desired.

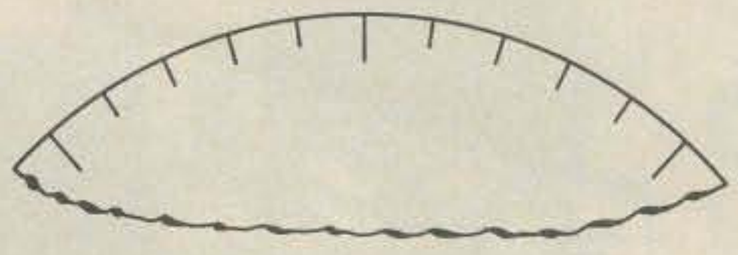
The upper two rows on the keypad on the right side of the FT-980 have a dual function. In the frequency entry mode (initiated by pressing the **ENT** key) one enters any desired transceive or receive frequency by following the numbers on the 0 to 9 keys. It doesn't matter what band one is using; one can switch instantly to another band once the frequency keyboard entry is completed. The other functions of the keys involve switching on or off the receive and/or transmit offset feature, choosing control of the transceiver by the v.f.o. or a memory channel, for split-frequency operation choosing whether the receive frequency will come from the v.f.o. or a memory channel, and setting tuning or "tab" limits for v.f.o. tuning. The latter is an interesting convenience feature. It can be used to limit v.f.o. tuning to a sub-band applicable to one's license grade, for instance, so one doesn't have to constantly monitor the frequency display. Once the "tab" limits have been entered, tuning by scanning will also be confined to those limits.

The memory channel switch is above the keypad and has four keys associated with it. To enter a frequency from a v.f.o. one simply sets the switch to one of the 12 memories and depresses a **WRITE** key. The mode for which the v.f.o. was set is also memorized. A **CHECK** key allows one to display the frequency and mode stored in each memory without changing the operating frequency of the transceiver. A **SHIFT** key allows any memory to become tunable, and if in tuning one finds a frequency of interest, using the **WRITE** key will enter that new frequency into memory. The system works extremely fine, but has only one slight disadvantage. When one selects a memory channel for usé, one cannot use the **MODE** selector. Therefore, if one calls up a memory channel that was entered for use with u.s.b., one cannot switch to l.s.b. without going back to v.f.o. tuning and then changing the mode and entering the frequency and mode into memory. When the memories are used for frequencies in the amateur bands, they can be used for full transceive operation, which is a great convenience, for instance, if one tunes across a band (or bands) in the v.f.o. mode, finds stations of interest in QSO, stores their frequencies in memory, and then wishes to instantly transmit once one of the stations is free.

During many hours of operation all of the features and controls on the FT-980 worked without fault. Full QSK was possible within a band and semi-QSK for crossband and/or crossmode operation. The FT-980 has so many convenience features that it takes a long time to appreciate them all. The various a.f. and i.f. filtering possibilities along with the i.f. shift and width controls, for instance, could be adjusted to overcome almost any QRM situation. The noise blanker was effective both against ignition noise and the "woodpecker." The dual metering system is very convenient. As usual, Yaesu's microphone squelch system (to reduce background noise) and r.f. processing system got excellent on-the-air reports. The operating manual for the unit is clear and very well illustrated. It also contains full electrical diagrams, which although not sufficient for complete service and alignment, are certainly sufficient for basic troubleshooting.

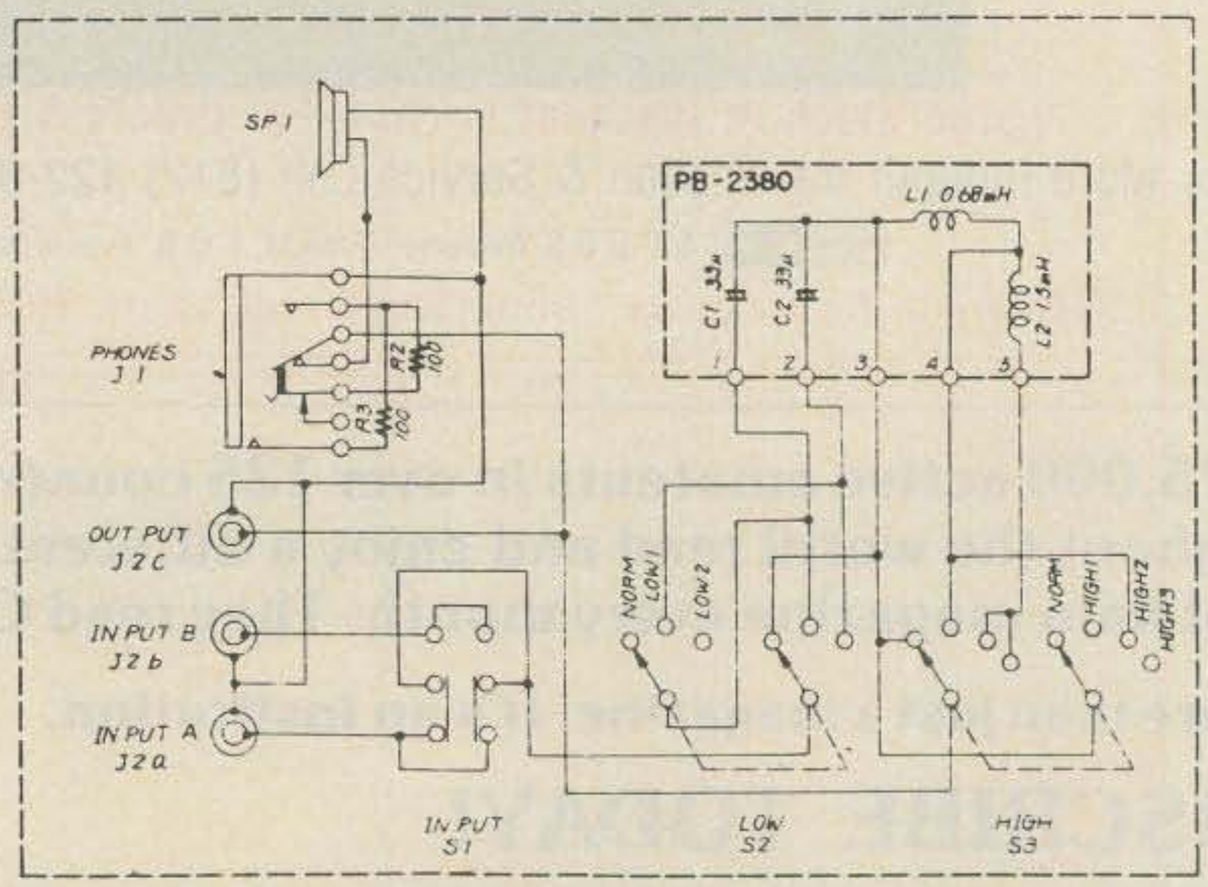
Even forgetting temporarily the computer control possibilities for the FT-980, I would not hesitate to endorse the FT-980 as a high-performance, heavy-duty base station transceiver that strikes an excellent balance between price and features. CQ





Main tuning dial skirt with small markers every 200 Hz and large ones every 1 KHz

Fig. 6– An illustration and explanation of the digital frequency "scroll" feature in the FT-980.



SPECIFICATIONS

Speaker Element:	
Diameter	120 mm
Power Rating	3 watts
Impedance	8 ohms
Frequency Range	100–12000 Hz
General	
Case Dimensions (HWD)	129 × 200 × 306 mm
Weight	2.2 kg

Filter Circuit Selections:		
LOW 1	below 300 Hz	(–6 dB/octave)
2	below 600 Hz	(–6 dB/octave)
HIGH 1	above 2.4 kHz	(–6 dB/octave)
2	above 1 kHz	(–6 dB/octave)
3	above 700 Hz	(–6 dB/octave)

Fig. 7– Specifications and electrical diagram for the optional SP-980 speaker/filter system.

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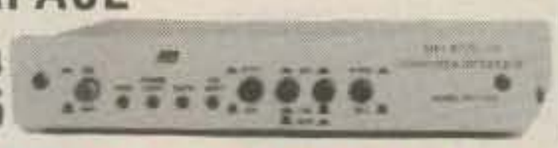

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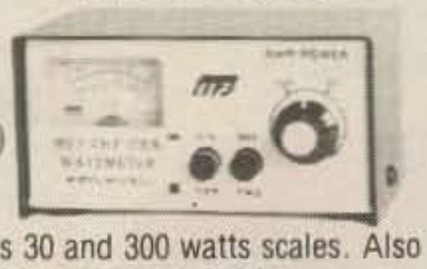

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CIRCLE 11 ON READER SERVICE CARD

Here's a one-hour (or less) project that will go a long way toward making you a better operator.

How To Build A Super Simple Keying Monitor

BY JIM BURTOFT*, KC3HW

Have you ever tuned the Novice bands (or worse yet, outside the Novice bands) and heard an operator with an absolutely atrocious "fist"? Someone whose keying was so bad that you felt like giving him a readability report of zero because he created his own QRM?

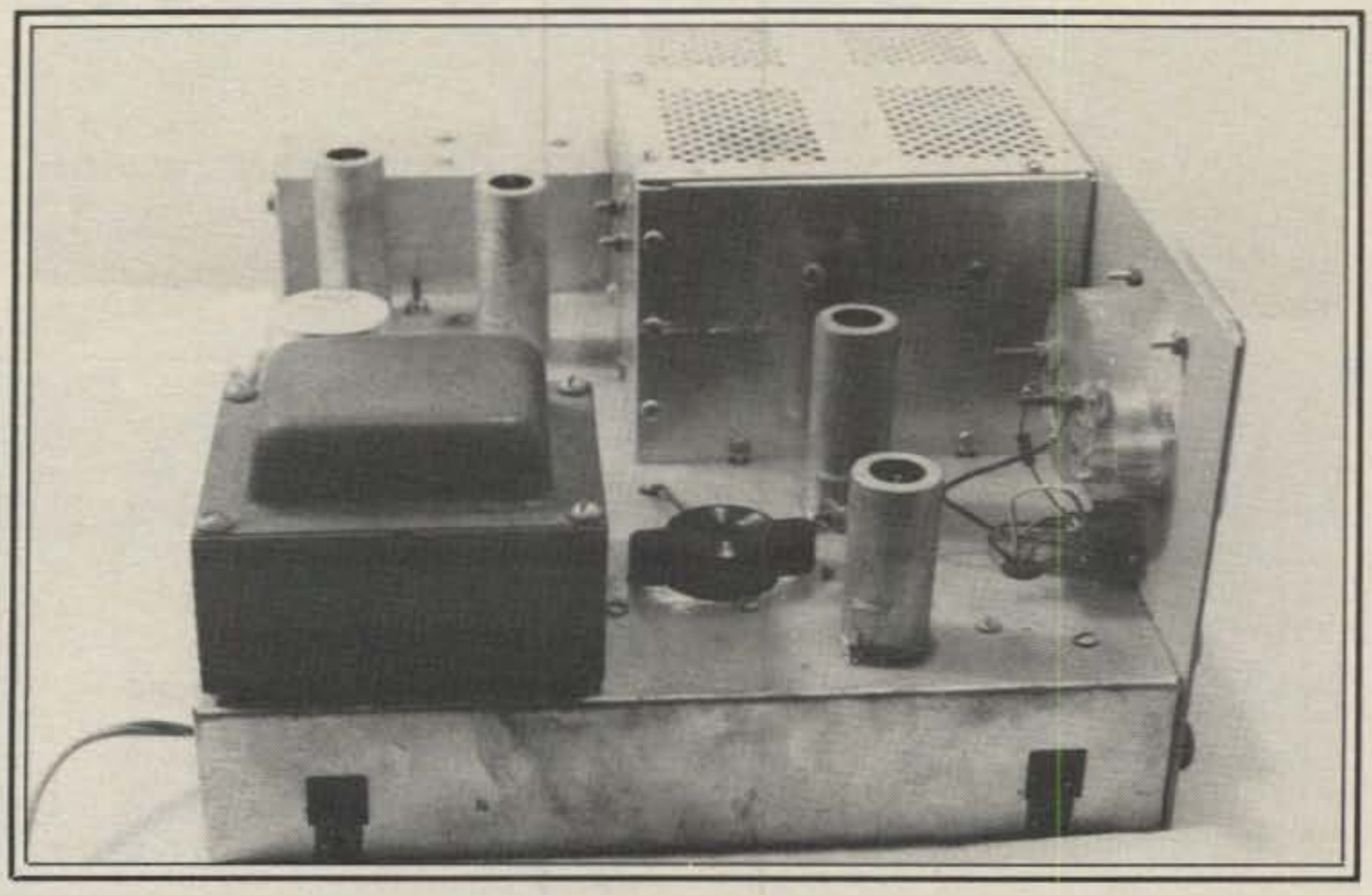
Poor keying is a problem that has been around since the days of old Sam Morse, and it isn't going to be solved by what we're going to say here. However, what we do say may help put a small dent in it.

One of the sources of keying problems is the low-cost rigs that most Novice amateurs use. Let's explain what happens.

Most amateurs learn to send using a code oscillator. During the learning process, the audio feedback of hearing his own fist helps the operator keep character formation clear and distinct. Unfortunately, most of the inexpensive rigs to which the newly licensed amateur graduates don't make provision for the operator to continue to hear his own keying.

How much does the lack of aural reinforcement affect the average amateur? It's hard to say, for it no doubt varies from person to person. It does have its effect, though; just listen to the bands. And, here's the kicker: unless you are listening to yourself, you can't be sure that you haven't been affected.

If you want to be sure that you are contributing to the *solution* rather than to the problem, then build this monitor and listen to your own keying.



Close-up of installed piezoelectric buzzer.

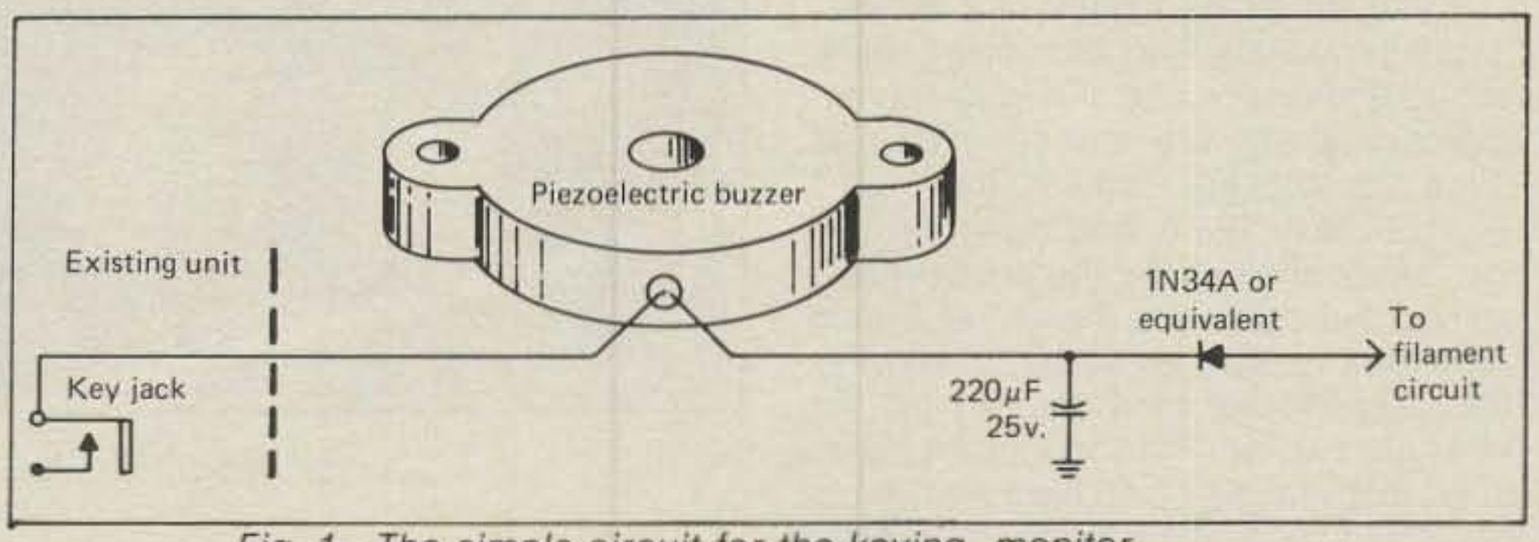


Fig. 1– The simple circuit for the keying monitor.

The Circuit

This three-component circuit is about the simplest possible. Notice that it isn't an oscillator. Instead, it's an electromechanical unit. After trying to design a simple transistor audio oscillator, I settled on the piezoelectric buzzer (Radio Shack 273-060 or the equivalent). No small oscillator could approach its simplicity, volume, or clarity of tone.

Power for the side tone is drawn from the filament circuit. The standard filament circuit provides 6.3 volts a.c. to ground. Check your rig's schematic and tap the circuit at any convenient point. If your rig has an accessory socket, it's easy to tap it at the back of the socket.

Diode D1 and capacitor C1 form a simple rectifier/filter circuit that converts the a.c. filament voltage to d.c. The components for this circuit are extremely noncritical. I used a 1N34A diode (10 for a dollar) and a junkbox electrolytic (mine had a working voltage of 25 volts). Observe the polarities on the diode and electrolytic capacitor. The buzzer is grounded through the key. Attach the positive terminal to the ungrounded side of the key.

Mount the piezoelectric buzzer at any convenient spot on the rig. The photo shows a simple mounting method. Sand a clean spot on the chassis. Drop a couple of drops of Superglue to the edge of the buzzer case and glue it to the chassis.

If the volume is too high, it can be lowered by partially covering the buzzer's opening. Experiment with a piece of cellophane tape. The greater the portion covered, the lower the volume.

One note of caution: Although you aren't working with high voltage, you certainly are working *around* high voltage when you work with a transmitter. Caution is always in order. Make sure that the rig is unplugged and filter capacitors are discharged.

This is an excellent Novice project. It's easy to build, has excellent tone and volume, and makes a truly valuable contribution to station operation. CQ

*RD 2 Box 131, Washington, PA 15301

Sometimes, if you're lucky, you can get more than a certificate or trophy for winning a contest. W3BGN won a lot more than he expected.

WHO SAID CONTESTING ISN'T WORTH IT?

BY STEVE SUSSMAN*, W3BGN

I am writing the first part of this article while cruising in a 747 at 37,000 feet and 500 mph on our way to Madrid, Spain, the stop before Seville and the April Fest.

It all started just over a year ago when unsolicited, my mail produced the rules for the 1982 Seville World Wide DX Contest. Upon reading the rules, my interest was immediately piqued by the Grand Prize: an all-expense-paid vacation for two to Seville, Spain, for the world-famous April Festival. I could not believe that after more than 20 years of DXing and contesting, I had not heard of this one. My immediate thought was that perhaps not too many others had heard of it either.

Being modestly successful in my contesting endeavors and loving to travel, I approached my wife. Her reaction was, "First *CQ* WW DX Contest, then ARRL DX, 160 Test, WPX, and now this. Oh, no!" I then showed her the prize and discussed the operating hours. She said, "You mean a contest with a prize other than a certificate or a plaque? Do you think you can win?" I thought that compared to my single-op 48-hour marathons this would be a piece of cake. It would start at noon local time on Saturday and run until 2 p.m. Sunday with four hours mandatory rest time. Finally she agreed to suffer through one more contest weekend and to support me with food and beverages. I only hope that all of you out there have wives as good as mine.

I did my usual preparations: made up check sheets and log sheets, made the bed in the shack, taped over the light dimmers that made noise, and switched the TV to another antenna so that I could independently rotate my 6-element 10 meter beam (which resides under the main TV antenna). This was to be a family project, and therefore I instructed the kids *do not disturb!*

*Heatherly, Pipersville, PA 18947

A typical April Festival scene in Seville, Spain.

This contest was to be a little different. It would be on both phone and c.w., all bands, and one's own country could be worked with reduced points. A strategy was worked out, as usual. It was to make as many contacts as possible.

The contest started and continued in a routine manner with much difficulty in explaining to many multipliers what contest I was in and what exchange to give. Many times I just begged, "Please help send me to Spain; give me a QSO." All continued until Sunday morning when I noticed a quite active YV in the contest on 10 meters. He was working stateside at a rapid clip: three points for him and two for me. I was ahead of him by QSO number when I first heard him, and a few hours later I was well behind him. We spoke, and I asked him how 40 and 80 were. He said he did not operate there. Wow! I still had a chance to catch him due to the multipliers I had picked up the night before on 40 and 80 c.w.

The contest ended without fanfare. My logs were duped and copied and sent off to the Radio Club of Seville, return receipt requested. Then the waiting started. I continuously tried to find out something, but to no avail: no competitive scores, no 2 meter info or 3.830 as in other contests. Waiting was the name of the game. I knew I could not have won, for that would have been too good to be true.

Months came and went, and it was time for the *CQ* WW DX SSB Contest. Be-

Say You Saw It In CQ

EA7CEC, ops. EA7RA, EA7EL, EB7EB.

The officials of the Seville Radio Club and the Government Cultural Minister present the award to W3BGN.

Juan, EA7TH, receives his award for the 1982 Seville World Wide DX Contest.

(Left to right) EA7CFW, EA7CEC, and W3BGN on tour.

ing the masochist that I am, again single op was the choice. About 2 hours into the contest EA7TH called me. We exchanged reports, and he said, "Congratulations! When are you coming to Seville?" It was unbelievable. I was in shock! I had scored third in the contest but first outside of Spain, and therefore, Ole! So there we were winging our way to sunny Spain.

Jose, EA7CFW, had been in close contact via 10 and 20 meter s.s.b. He was terrific. The plane tickets arrived, and I packed my bags with a few electronic goodies difficult to get in Spain, plus a Frankford Radio Club film. We started our journey on Ransome Air out of Philadelphia. This airlines is owned and operated by K3MBF. Unfortunately, our original flight was cancelled, and we barely made it to Iberia flight 952 to Madrid; our luggage did not make it. On the flight I happened to notice someone across from me reading a copy of *QST*. What a coincidence! I introduced myself to EA4OX. He loaned me his May *CQ* to read on the way.

We arrived in Seville late Wednesday morning to an entourage of EA7's with a bouquet of flowers for my wife and much greeting and picture-taking. I felt like a real celebrity. They took us to our hotel, and we checked in and went to sleep. Four hours later it began. Jose, EA7CFW, Juan, EA7CEC, and Juan, EA7TH, took the initiative to show us around. What a whirlwind! From 8 a.m. until 5 a.m. we visited, ate, drank, and watched Flamenco. We went to the April Festival almost every day and night. At 4 a.m. in the morning there were still one million people in attendance! This festival is not well known in the USA, but it is the largest in Europe and very, very impressive. It would be impossible to explain. James Michener's book *Iberia* does it better.

I met 30 EA7 amateurs and got on the air twice to work mostly the Frankford Radio Club on 20 meters. The hospitality of EA7EL and EA7BUV and his son EB7EB was superb. I have traveled the world in more than 50 countries and have met many hams, but it would be tough to beat the hospitality of the Seville Radio Club. We toured the city, met the mayor, attended a bull fight, and had many pleasant dinners. But the most important thing was the warmth of these people. They made us feel totally at home even though my Spanish is just about useless. For me a genuine friendship and closeness developed with my fellow DXers and contesters from Seville, and also with Luis, EA1ABT, the Spanish winner of the contest, and his wife.

We had one final dinner and a grand time was had by all. We left for the airport the following morning with some of the fondest memories of our lives and a list of new friends. In my 28 years of involvement in amateur radio I had never believed that I would have such a wonderful experience. If any of you reading this have been contemplating contesting, come on in; the water is fine. The camaraderie, the challenge, and the rewards are definitely worth it!

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CQ REVIEWS:

The Nye Viking MB-V Antenna Tuner

BY LEW MCCOY*, W1ICP

Anyone who knows much about my amateur radio writing knows that I have designed and described many different types of Transmatches (antenna tuners) and s.w.r. indicators. However, for some reason I have never had the opportunity to describe many commercially made Transmatches and antenna tuners. That is one reason I am happy to do a review of the Wm. M. Nye Co. MB-V 3 kw antenna tuner. I don't know how many readers have ever seen the MB-V, but this unit is what I call a "class act." When you see the inside of the tuner, you are immediately impressed by all the silver-plating, the rugged components, and the excellent layout. These details of workmanship and craft immediately place the MB-V in a class by itself.

Circuit Details

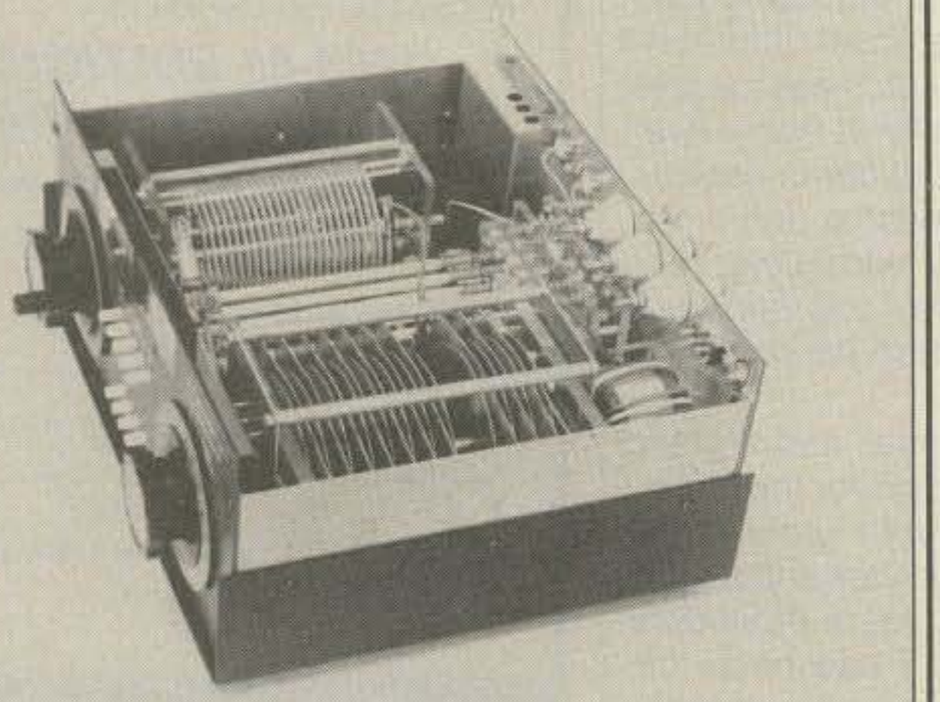
The tuner's circuit is shown in fig. 1. You will note that it is primarily a pi-network configuration. The circuit is designed to match antenna loads of 40 to 2000 ohms. (My tests showed a slightly better matching range than the manufacturer specified, but more about that in a moment.) Also included in the circuit is a trifilar-wound balun which enables the user to match the unbalanced output to a balanced line, such as open-wire feeders or twin-lead. The range here is from 200 to 2000 ohms resistive loads.

Fig. 2 is a drawing of the s.w.r. meter circuit and power meter indicator. The MB-V includes two large panel-mounted meters—one to indicate standing-wave ratio and the other to show power output (300 or 3000 watt scale). The meters can be illuminated if desired. The s.w.r. meter does not have to be "set," and the reading is automatic.

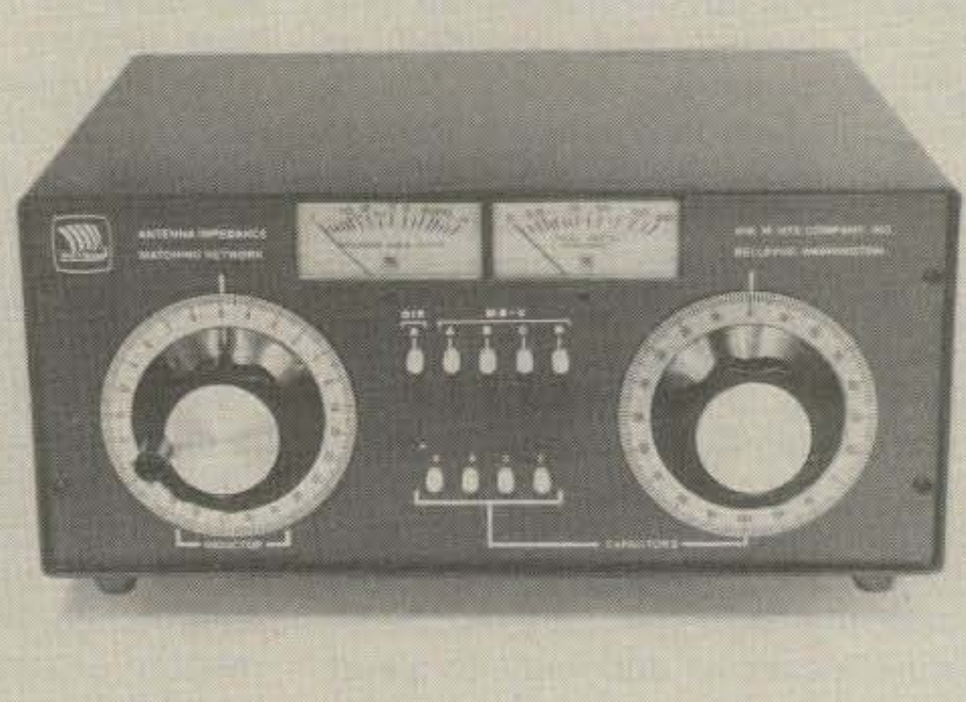
Going back to the circuit tuner details, the pi inductor is a heavy-duty, silver-plated, continuously variable inductor with a very smooth 25:1 vernier drive. The coil has a total inductance of 23 uH. Because of the continuously variable inductor the MB-V has a frequency coverage of from 1.5 to 30 MHz. If you'll look at the front view photograph, you'll see that there are five pushbutton switches just below the meter. These give you several choices of antenna feeds. The first switch permits you to go straight through from the transmitter to the antenna, the second switch puts coax feed "A" onto the tuner, and the third switch connects coax feed "B." The next switch connects a single wire feed, and the last connects twin feeders.

The next row of switches is used to insert or remove additional fixed-output capacitors. In one position an additional variable capacitor, 100 pF, is switched in parallel, with the regular pi output variable a 70 pF. Incidentally, the variable capacitors use "polished" plates plus exceptionally wide spacing, 7000 volt rating. The capacitor switches are rated at 15000 volts (!). All this excellent material makes up the "conservative" 3000 watt rating. Incidentally, I couldn't test the unit at this power level because of two reasons. First, such power would be illegal to use, and second, and probably more important, I don't have a transmitter capable of 3000 watts output. However, I have always believed in "overkill" in equipment design, so this Transmatch certainly gets my vote on the power score.

Technical Consultant, CQ, 200 Idaho St., Silver City, NM 88061



Here is the Nye Viking 3000 watt MB-V antenna tuner. The dial at the left is the smooth vernier drive for the variable inductor. The illuminated meters are very easy to read.



It is quite apparent from this inside view that the components can best be described as very rugged. Also, it shows the excellent workmanship.

Say You Saw It In CQ

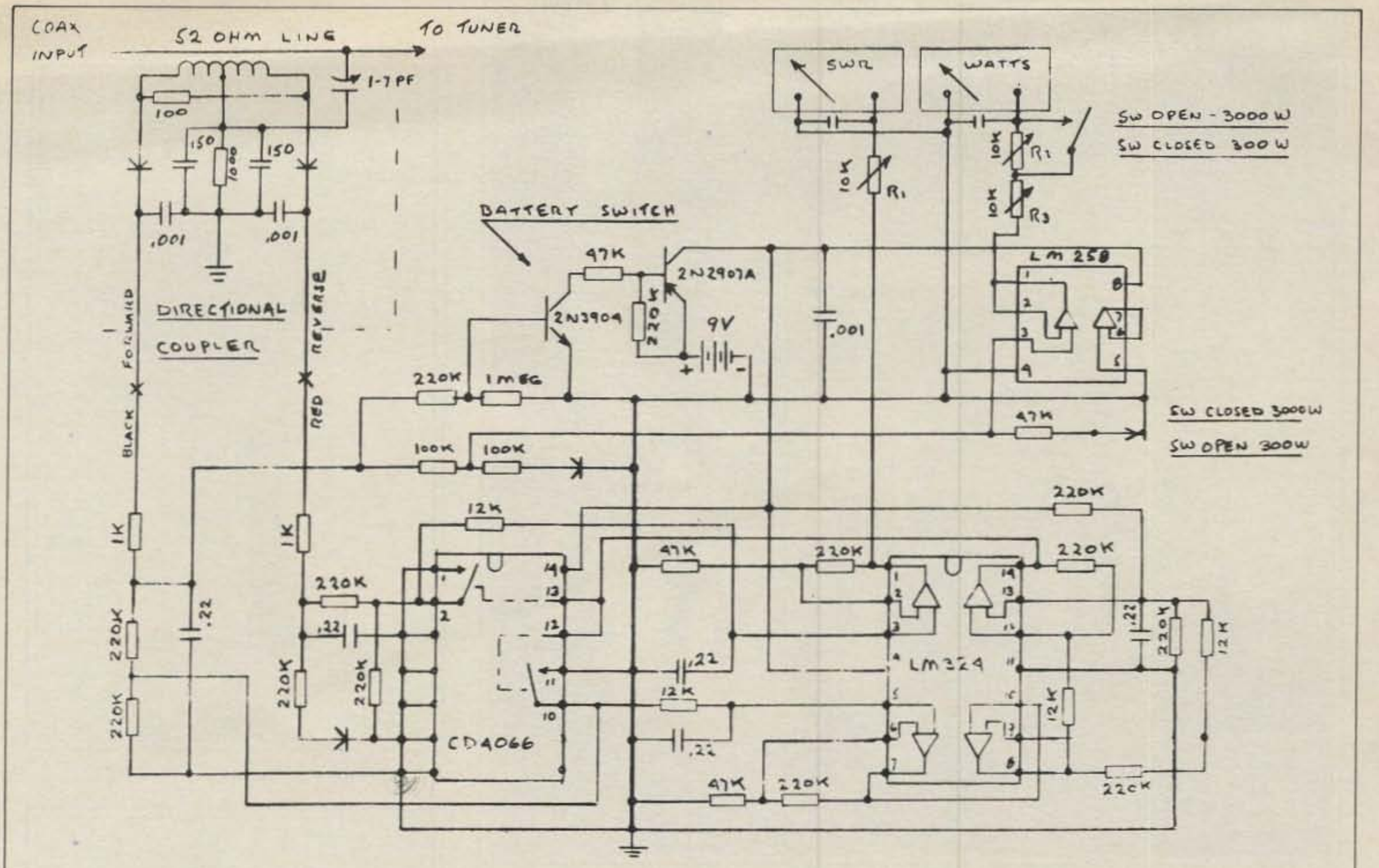


Fig. 1– Circuit diagram of Nye MB-V antenna tuner.

The tuning knobs for the vernier and output variable controls are 2¼ inches in diameter with 4 inch diameter dials (very easy to read). The meters are 2½ inches across the face and again are easy to read. Like I said earlier, this is a class act. Incidentally, the power meter is a peak-reading circuit.

Tests and Other Observations

I tried the MB-V on several antenna matching tests, and I found it exceeded the manufacturer's specs. I matched one vertical to a 1 to 1 match that had an impedance of no more than 25 ohms (rating is 40 ohms). I had an 80 meter dipole which would have a feed impedance on the order of 4000 ohms, and I managed a match on that by juggling the feed-line length, so I assume I matched a load over 2000 ohms. (I don't recommend such practices because the mismatch could be on the order of 80 to 1, and your coax would probably blow out at high power! However, in this case I know the MB-V is rugged enough to sustain high power without arcing, etc. It is just that your coax wouldn't take it.) I also matched the coax-fed 80 meter half wavelength on 20, 15, and 10 using the MB-V, so it has plenty of matching range.

The instruction manual is detailed and adequately covers the use of the MB-V. It also includes information about antennas and matching.

The MB-V measures 14¼ inches wide, 6¾ inches high, and 12 inches deep. It weighs 8.5 kilograms (19 pounds). The list price of the MB-V is $535.00. It is manufactured by Wm. M. Nye Co., Inc., 1614 130th Ave. N.E., Bellevue, WA 98005 (206-454-4524). CQ

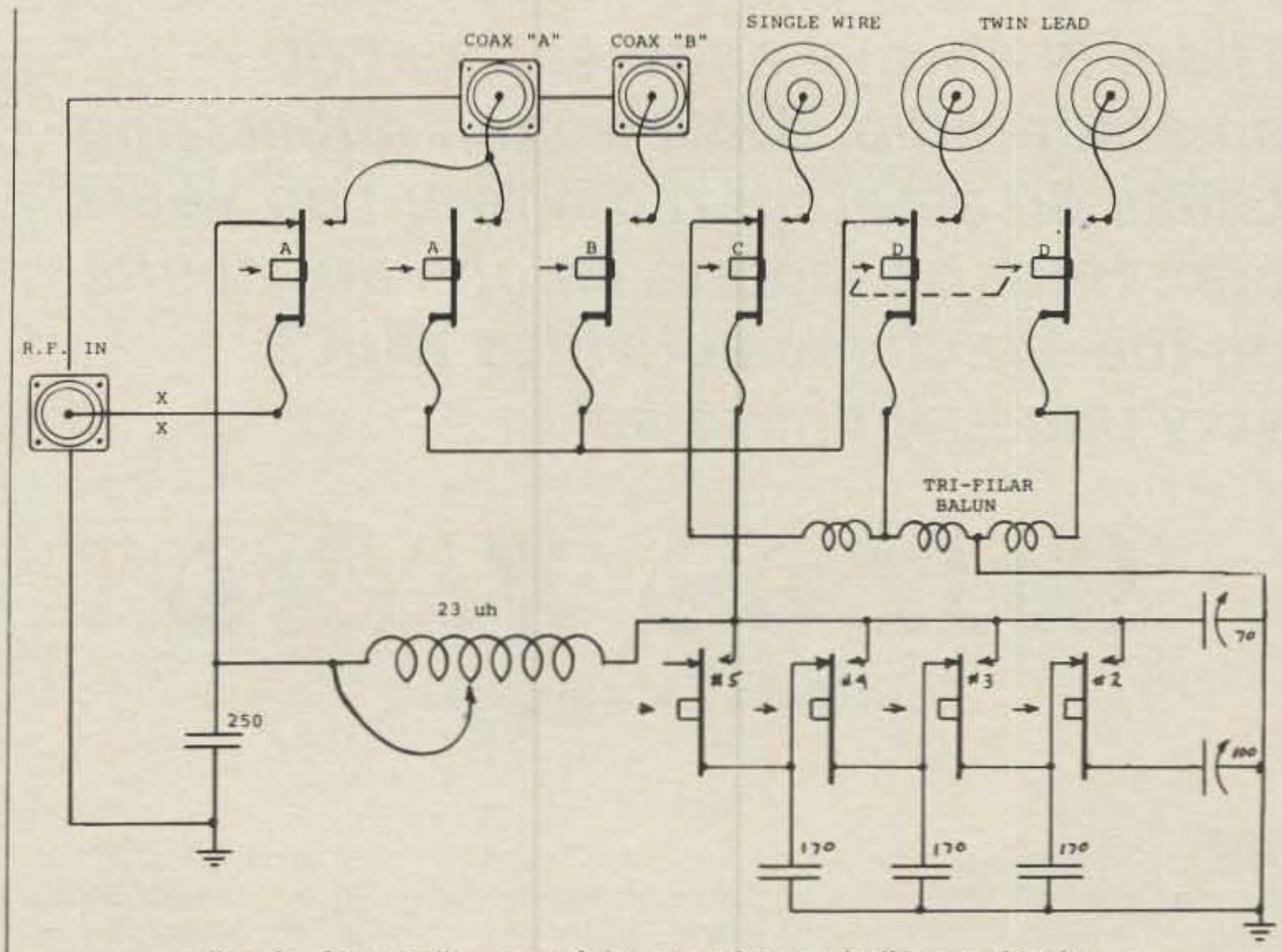


Fig. 2– Circuit diagram of the s.w.r./power-indicator circuitry.

Tom Palmer, WX4V, at his radio-chess station, which shows chess-move relay operator "Frankie T. Bell" poised at the microphone. Rig is a Kenwood TS-430S, Bencher paddle, feeding into dipoles or the classic "36" tribander. In the foreground is, of course, the chess set.

White's king, Ike Eisenhower.

Black's pawn, German soldier.

There is always another facet of amateur radio. K2VJ began publicizing chess on amateur radio over two years ago. Here he reports on one amateur's on-the- air chess activities with a very unusual chess set.

CHESS WARS

BY VINCE LUCIANI*, K2VJ

What did Mamie Eisenhower have in common with Eva Braun? A 500 lb. bomb with a V-2 rocket? A Sherman tank with a Panzer Kampwaggon tank? Would you believe a chess set?

Tom Palmer, WX4V, is a chess-playing attorney and a member of CARI (**C**hess & **A**mateur **R**adio **I**nternational). His unique chess set is a replay of "Doublya-Doublya Two" every time Tom gets on the air for some radio-chess. He bombed me in 29 moves on 20 meter s.s.b. one night when he moved Mamie (his queen piece) into board position "Golf Eight" (algebraic notation for chess moves in which each square has a letter-number identification). That move was a check-mate for my king (Hitler).

Tom's custom-made chess set was designed by Tom and constructed by artist Chuck Caldwell of Gettysburg, Pennsylvania.

"I mailed to Chuck the pictures of what I wanted with specific instructions," said Tom. "Chuck had never made a chess set before, although he has done some fantastic carving of other items. However, he knows little about chess sets."

What Chuck eventually came up with

*733 W. Duerer St., Egg Harbor, NJ 08215

Say You Saw It In CQ

White's pawn (kingside), "GI Willie."

pieces," said Tom, "except for the tanks. I made the tanks from 1/72nd plastic model kits and painted them with an airbrush."

Tom described Chuck's shop in Gettysburg as "a joy to visit, it being 'Chuckfull' of hundreds of little figures in Chuck's specialty of soldiers and sports figures. Chuck was contracted to make sports figures for the 1984 Olympics."

Tom, who went from Novice to Extra class in one year in order to take full advantage of the bands for his keen interest in radio-chess, had Chuck sign all the pieces. Chuck, who was a Marine in WW II, refused, however, to sign the Hitler figure. "I had a difficult time just to convince him to fashion a Hitler figure at all," reported Tom. "Several times before he had refused to make a Hitler figure for other people. He agreed to make mine because it was part of a complete set."

Should you QSO WX4V on the air, be sure to get his QSL card, whether or not you are a chess fan. His card not only has photos of all the chess pieces on it, but there is also a chess quiz on back, the CARI frequencies, and in one corner, space for your callsign, signal report, etc. Radio-chess enthusiasts are like that.

(Note: For those who wish to know more about CARI, this organization had its kick-off with the cover photo and feature article in CQ magazine (May 1982). Since then over 200 members in a dozen countries enjoy radio-chess often on established frequencies, on nets, and in tournaments. For more info, write to CARI, P.O. Box 682, Cologne, NJ 08213 U.S.A.) CQ

for Tom's chess set were the following pieces:

White
Pawn: GI Willie & GI Joe
Rook: 500 lb. bomb
Knight: Sherman Tank
Bishop: Omar Bradley & George Patton
Queen: Mamie Eisenhower
King: General Eisenhower

Black
Pawn: German Infantrymen
Rook: V-2 Rocket
Knight: Panzer Kampwaggon Tank
Bishop: Hermann Goering & Heinrich Himmler
Queen: Eva Braun
King: Hitler

Each of the white pawns has a different yet authentic arm patch. Four of these are GI Joes, while four are GI Willies. Their ranks are private and corporal. Each is equipped with cartridge belt, canteen, bayonet, and M-1 rifle.

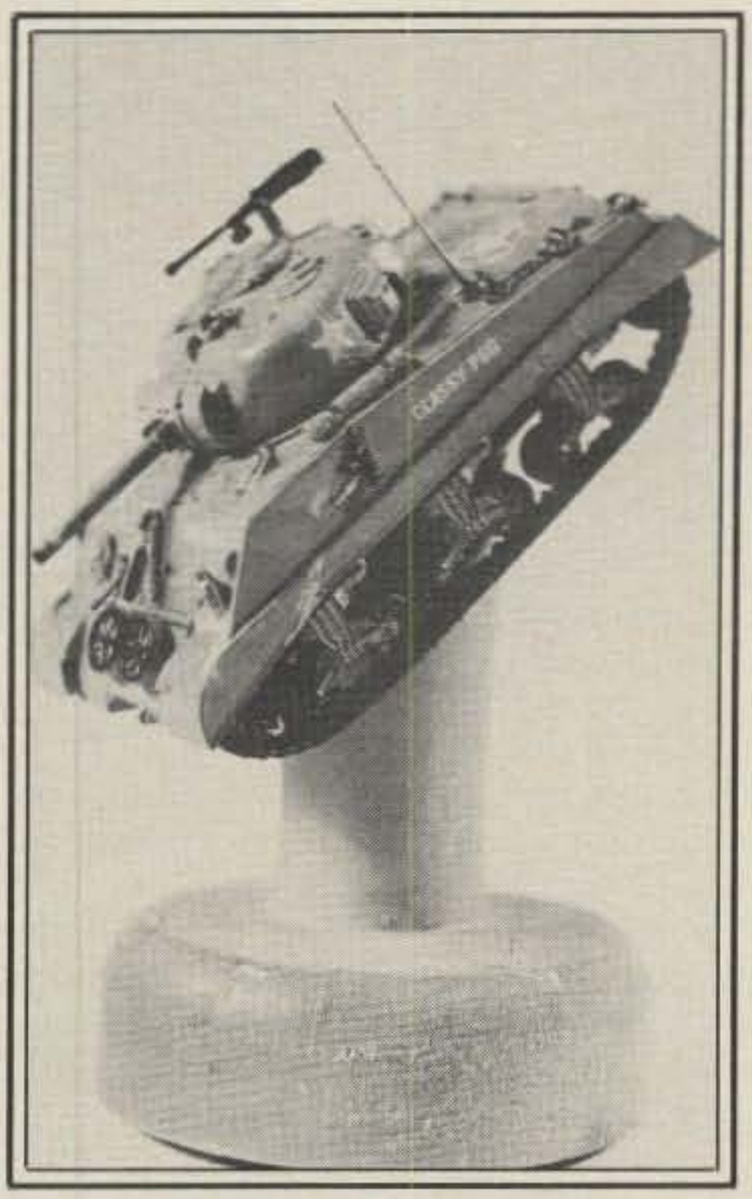
The German (black) pawns are also fully equipped, having poncho, tent-half, gas-mask canister, and rifle (including 1/64th inch long rifle slings across the right shoulder).

The tiny medals on Generals Patton, Bradley, Eisenhower, Himmler, and Goering are made in the true colors of the medals commonly worn by them. Himmler's eyeglasses have little plastic lenses that are about the size of the head on a straight pin.

Polyfoam material was used for the chess pieces. The opening photo gives an idea of piece sizes: kings are 5⅕ inches high and pawns are 2¾ inches.

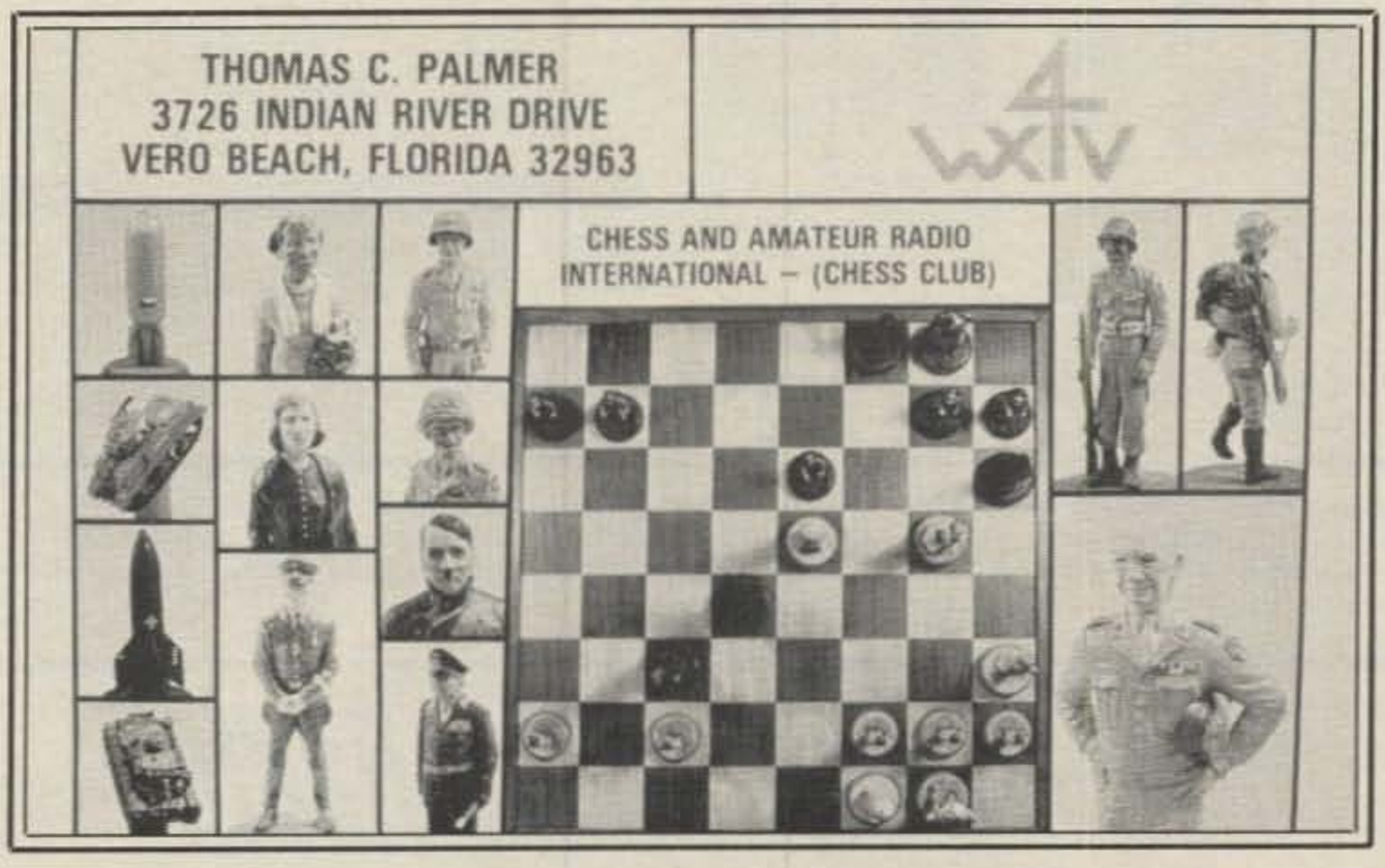
"Chuck hand-painted each of the

Black's Bishop (queenside), Himmler.



White's knight (queenside), Sherman tank.

QSL card of Tom Palmer, WX4V.



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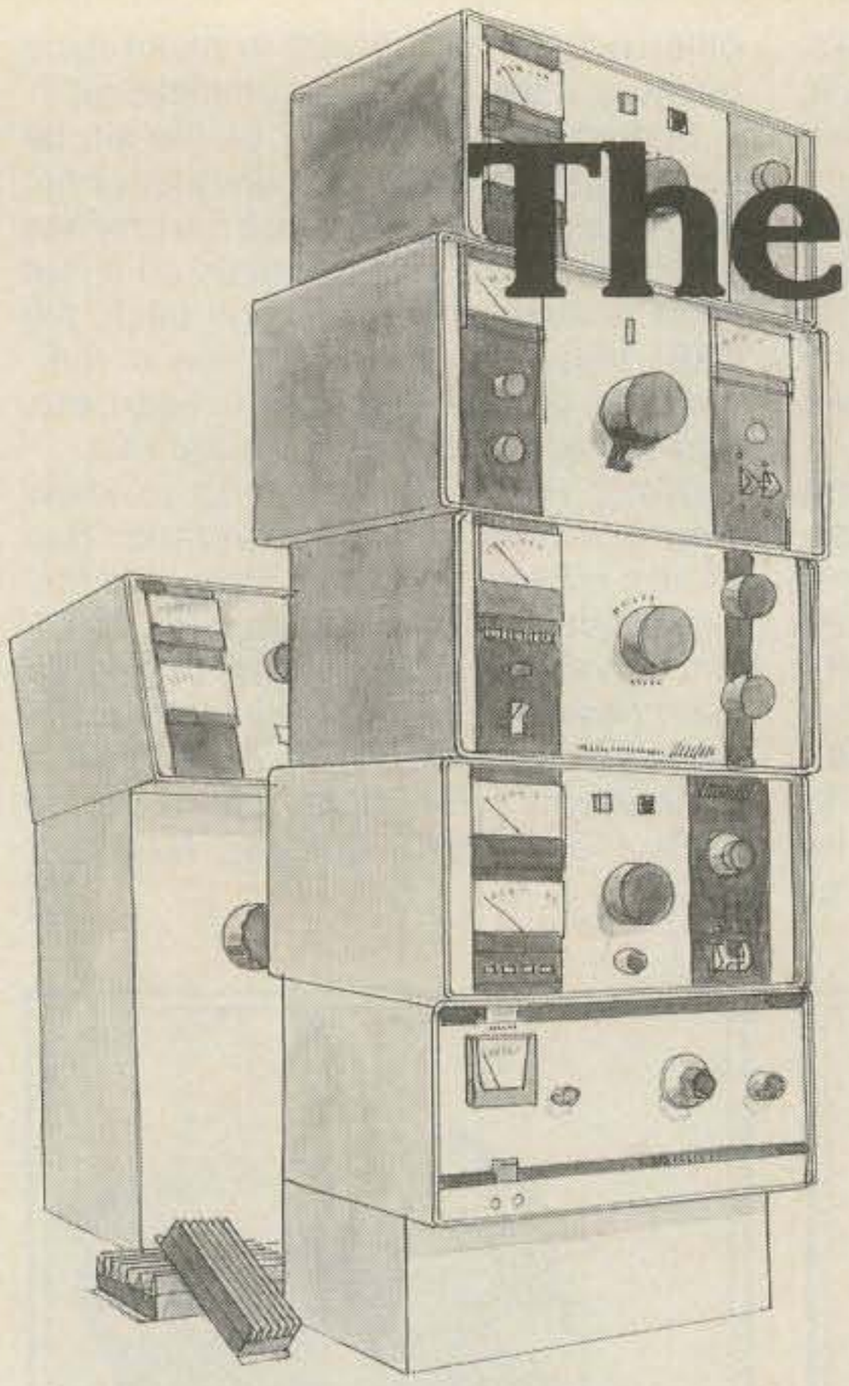

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2004-A is identical to the 2002A except that it is set up for the 430 to 450 MHz band. This amplifier uses a 1/2 wave strip line and offers all of the same specifications as the 2002A.

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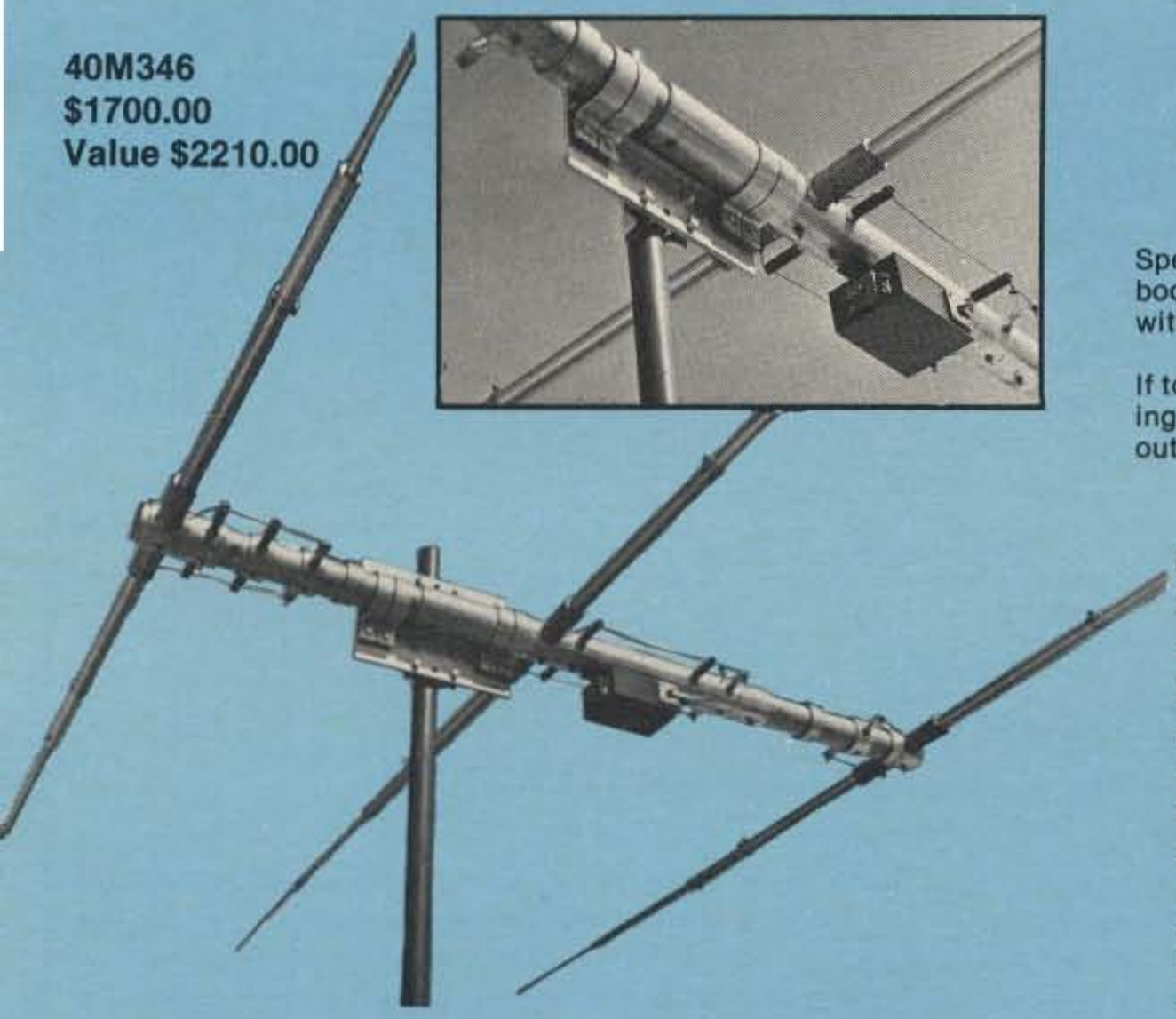

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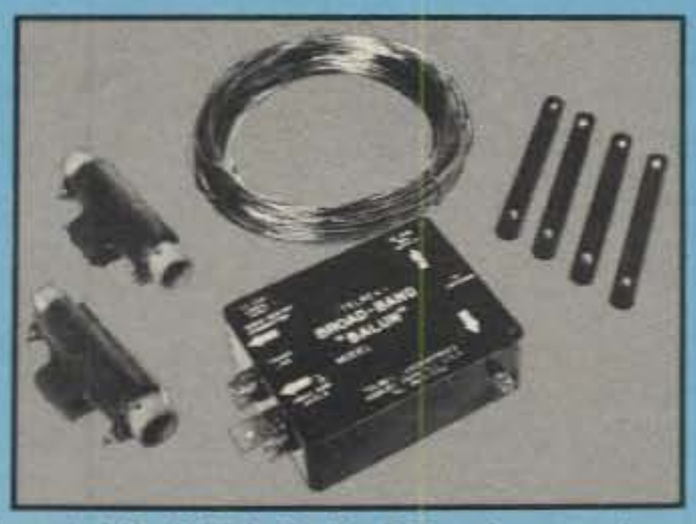

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10M636	10 Meter 6 element	(14.6 DBD)	878.00	675.00
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40M214	40 Meter 2 element	(5.6 DBD)	865.00	665.00
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40M346	40 Meter 3 element	(9 DBD)	2210.00	1700.00
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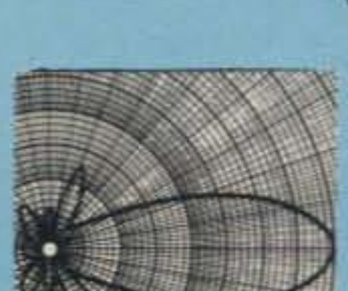

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BY THOMAS R. SUNDSTROM*, W2XQ

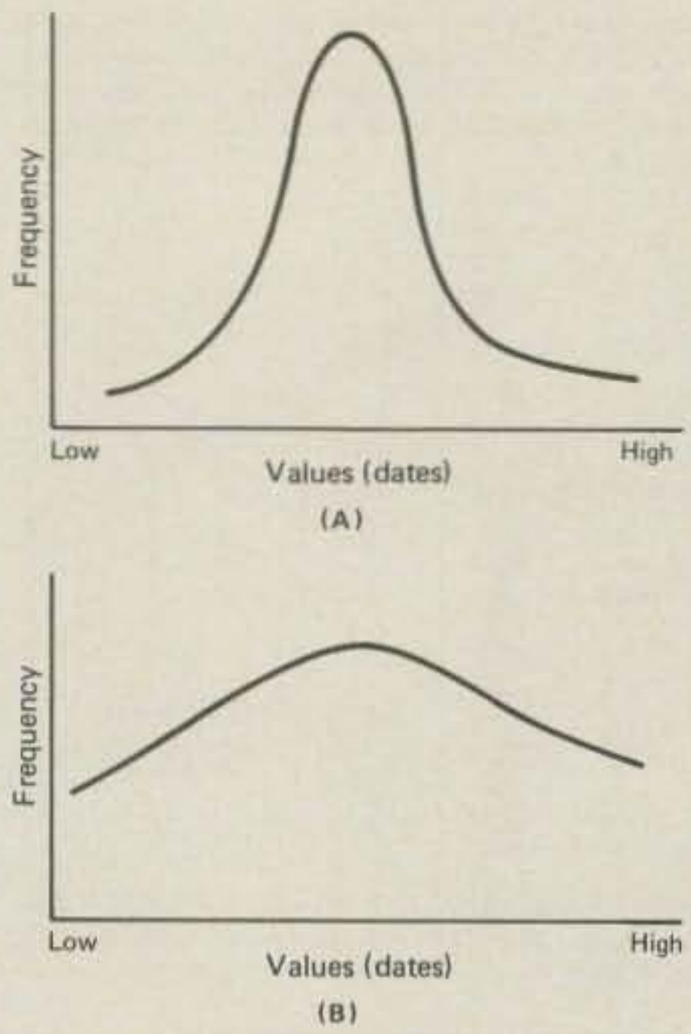

Fig. 1– The statistical term for a very peaked distribution with data points close to the mean is "leptokurtic," meaning "narrow humped" (A). A distribution that is flat in the middle with data points far from the mean is known as "platykurtic," meaning "broad humped" (B).

```
]
]


]

50  HOME : VTAB 5: INVERSE : HTAB 10: PRINT "SOLAR FLUX AND A-INDEX": HTAB
     9: PRINT "STATISTICAL CALCULATIONS": NORMAL : VTAB 10
80  INPUT "ENTER MONTH AND YEAR: ";D$
85  PRINT
90 TF = 0:TA = 0:NF = 0:NA = 0:MF = 0:MA = 0
100  INPUT "ENTER THE NUMBER OF DAYS: ";D
110  PRINT : PRINT "ENTER THE DATA SEPARATED BY A COMMA"
112  HTAB 5: PRINT "...SOLAR FLUX AND A-INDEX"
115  PRINT
120  FOR I = 1 TO D
130  PRINT "DAY ";I;":" TAB( 12);
140  INPUT F,A
150 TF = TF + F
160 TA = TA + A
170 NF = NF + F ^ 2
180 NA = NA + A ^ 2
190  NEXT I
200 MF = TF / D
210 MA = TA / D
220 VF =  SQR ((NF - D * MF ^ 2) / D)
225 VA =  SQR ((NA - D * MA ^ 2) / D)
230  HOME : VTAB 3
235  HTAB 10: PRINT "DATA FOR: ";D$
236  PRINT : PRINT "-----------------------------------------": PRINT
240  INVERSE : PRINT "SOLAR FLUX": NORMAL
250  PRINT  SPC( 20)"MEAN: ";MF
260  PRINT  SPC( 6)"STANDARD DEVIATION: ";VF
265  PRINT : PRINT "-----------------------------------------": PRINT
270  INVERSE : PRINT "A-INDEX": NORMAL
280  PRINT  SPC( 20)"MEAN: ";MA
290  PRINT  SPC( 6)"STANDARD DEVIATION: ";VA
295  PRINT : PRINT "-----------------------------------------": PRINT
300  VTAB 22: PRINT "DO YOU WANT TO RUN THIS PROGRAM AGAIN?"
305  HTAB 33: PRINT "(Y/N)  ";: GET Y$: PRINT Y$
310  IF Y$ = "Y" GOTO 50
320  HOME : END
9999  REM  CATALOG NAME FLUX/A MONTHLY CALC
```

A simple statistical program listing for propagation.

In the September 1983 issue of *CQ* I discussed a simple way to keep records of the propagation indices broadcast by WWV at 18 minutes past the hour. A single page per month form was included.

The solar flux, ranging from 60 to 400 units, is a measure of activity on the sun and has a positive correlation to the maximum usable frequency. The *A*-index is a daily measure of geomagnetic activity around the poles of the earth on a scale of 0 to 400 units. The *K*-index is mathematically related to the *A*-index, also measuring geomagnetic activity, but this one is updated every three hours.

In the first round of this discussion I had suggested plotting the solar flux and the *A*-indices on graph paper. The horizontal axis should be a minimum of 27 days, and the vertical axis can be scaled for the range of daily values encountered. Plotting multiple 27-day periods on one graph yields some interesting information as a troublesome sunspot group rotates into view for a second or third time.

Another interesting look at the monthly data gathered can be derived from calculating a **monthly mean** and **standard deviation**. Don't let the statistical talk scare you away; the terms are easily defined. A **mean** is nothing more than an *average*. For example, the mean solar flux value is calculated by adding up all the daily solar flux values and dividing by the number of days in the month. The same can be done for the *A*-index. One of the problems with looking at only the mean (and other measures of central tendency) is that the mean, used alone, does not tell you how

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Say You Saw It In CQ

```
]
]RUN
          SOLAR FLUX AND A-INDEX
         STATISTICAL CALCULATIONS
ENTER MONTH AND YEAR: AUGUST 1982

ENTER THE NUMBER OF DAYS: 31

ENTER THE DATA SEPARATED BY A COMMA
    ...SOLAR FLUX AND A-INDEX

DAY 1:      ?120,10
DAY 2:      ?144,26
DAY 3:      ?151,26
DAY 4:      ?163,16
DAY 5:      ?176,17
DAY 6:      ?196,23
DAY 7:      ?214,70
DAY 8:      ?214,10
DAY 9:      ?207,20
DAY 10:     ?204,28
DAY 11:     ?202,20
DAY 12:     ?191,25
DAY 13:     ?181,15
DAY 14:     ?172,10
DAY 15:     ?165,5
DAY 16:     ?158,7
DAY 17:     ?161,13
DAY 18:     ?164,16
DAY 19:     ?156,11
DAY 20:     ?141,13
DAY 21:     ?136,14
DAY 22:     ?136,16
DAY 23:     ?138,16
DAY 24:     ?140,22
DAY 25:     ?155,18
DAY 26:     ?163,16
DAY 27:     ?177,10
DAY 28:     ?178,10
DAY 29:     ?180,29
DAY 30:     ?171,23
DAY 31:     ?177,13
          DATA FOR: AUGUST 1982

--------------------------------------

SOLAR FLUX
                    MEAN:  168.741935
      STANDARD DEVIATION:  24.3177348

--------------------------------------

A-INDEX
                    MEAN:  18.3225806
      STANDARD DEVIATION:  11.2919814

--------------------------------------

DO YOU WANT TO RUN THIS PROGRAM AGAIN?
                          (Y/N)  N
```

A sample output for a 31-day period showing solar flux and A-index, mean, and standard deviation.

the data is distributed around the mean. Are the daily values tightly grouped around the mean, or are they spread out over a wide range? (See fig. 1.)

One measure of distribution around the mean is the **standard deviation**. The standard deviation is a *measure of variation*, or differences, of the individual data points and the mean. In lay terms, two thirds of all values used to calculate the mean are in the range of plus-and-minus one standard deviation from the mean. Plus-and-minus two standard deviations encompasses approximately 99 percent of all values. For example, in August 1982 the solar flux varied from 120 to 214. The mean was 169 and the standard deviation was 24. Two thirds (one standard deviation) of the daily flux values fell in the range of 145 (169 – 24) and 193 (169 + 24).

In putting this information into practice, the smaller standard deviation values should reflect months of relative stability in h.f. propagation conditions. A large standard deviation probably means some significant disturbances took place. For example, Cycle 21 hit its peak in November 1979 with a solar flux value of 383. In October the high was 242, and in December it was 247. The standard deviations for October, November, and December 1979 were 13, 60, and 30 respectively.

Calculating the mean and standard deviation can be a nuisance without a calculator having special function keys. An easier way, if you have a microcomputer, is to type in and run the accompanying program. The program is written in Applesoft Basic, but it should not be difficult to convert it to other machines.

The program prompts you to enter the month and year, the number of days to be calculated (there is no reason why a mean and standard deviation could not be calculated on a weekly basis to look at shorter range trends), and, on a per-day basis, the solar flux and the *A*-index. A loop is established, and upon completing the number of days defined, the program exits the loop with its calculations* to the print statements. The resulting screen output is copied onto my notebook form. It's simple enough to switch the program output to a printer, but I didn't bother (it's just another piece of paper to file, since I keep the daily notebook-based form anyway).

Any questions? I'll be glad to answer those I can, but an s.a.s.e. is a must.

**For those with a statistical background, the standard deviation formula is for ungrouped data and a population. The formula may be found in any statistical textbook. I used John E. Freund and Frank J. Williams'* Modern Business Statistics, *p. 85 (Prentice-Hall, Inc., 1958).* CQ

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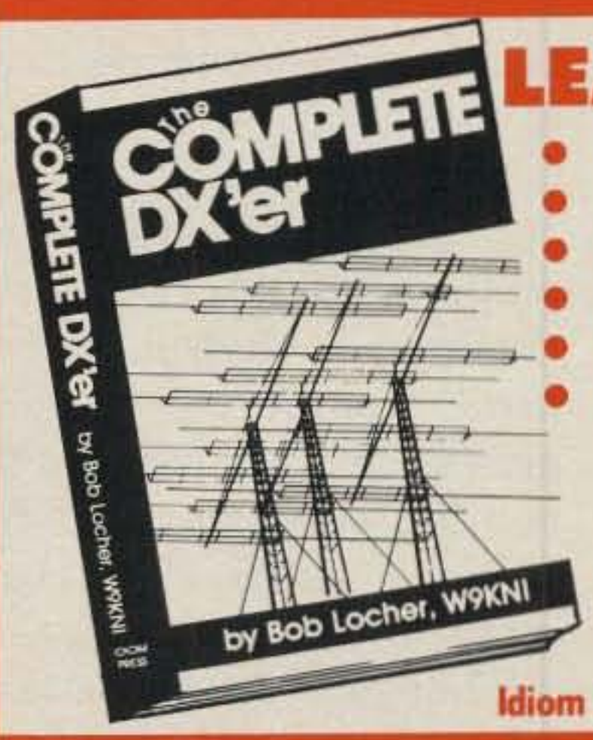

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BY THOMAS M. HART*, AD1B

How often have you seen an article on some amateur radio application that interests you? It may be something as simple as a logging routine or something more complex, such as an RTTY application. Even though you find the article interesting and the program listing provided for three popular home computers, it is inevitable that *your* computer is not included in the listing. Is this the end? Not necessarily.

It is quite possible and practical to convert a program from one dialect of Basic to another without an advanced degree in Computer Science from MIT. True, some programs will involve more work than they deserve; programs with PEEK and POKE statements may consume more time to convert than they deserve. However, many programs prepared for a specific machine can be typed into other computers with very little editing and modification. Study the program; analyze the inputs, outputs, subroutines, and tricks; plus make use of any REM statements that the authors may have provided. When in trouble with some esoteric point, get your local 2 meter repeater and ask for help. There are a lot of amateurs out there who have an interest in computers and can help you debug programs. That advanced degree from MIT may be monitoring the 04-64 machine, waiting to help.

This article is intended to be an introduction and not an all inclusive course in programming. It will, hopefully, give you some of the tools to start your own experiments. I expect that much of the homebrewing of this decade and the next will be in the area of computer software. Instead of tubes, capacitors, resistors, and IC's, the application on a home computer will be the experimental forum.

Four popular home computers are covered in the accompanying table. The Apple II, Commodore, Timex/Sinclair, and TRS-80 are shown. Dialectic Basics are compared for some of the more common statements and functions. CQ

Item	Apple II	Commodore	Sinclair	TRS-80
Absolute value of x	ABS(x)	ABS(x)	ABS(x)	ABS(x)
Logical connector	AND	AND	AND	AND
ARCTAN of x (radians)	ATN(x)	ATN(x)	ATN(x)	ATN(x)
Run machine language routine at location x	CALL x	NONE	USR(x)	USR(x)
Set variables to 0	CLEAR	CLR	CLEAR	CLEAR
Continue program without changing variables	CONT	CONT	CONTINUE	CONT
Cosine of x	COS(x)	COS(x)	COS(x)	COS(x)
Data stored for sequential reading	DATA X,Y,Z	DATA X,Y,Z	NONE	DATA X,Y,Z
Variable array	DIM x(y)	DIM x(y)	DIM x(y)	DIM x(y)
String dimensions	DIM x$(y)	DIM x$(y)	DIM x$(y)	DIM x$(y)
Delete line x	DEL x	NONE	NONE	DELETE x
Stop program	END	END	NONE	END
Goto subroutine x	GOSUB x	GOSUB x	GOSUB x	GOSUB x
Goto line x	GOTO x	GOTO x	GOTO x	GOTO x
Clear screen	HOME	(SPECIAL KEY)	CLS	CLS
Enter data	INPUT	INPUT	INPUT	INPUT
Compute the integer of x	INT(x)	INT(x)	INT(x)	INT(x)
List program	LIST	LIST	LIST	LIST
List program at line x	LIST x	LIST x	LIST x	LIST x
Load from cassette	LOAD	LOAD	LOAD	CLOAD
Clear memory of program	NEW	NEW	NEW	NEW
Return value of memory	PEEK(x)	PEEK(x)	PEEK(x)	PEEK(x)
Print graphics at coordinate x,y	PLOT x,y	NONE	PLOT x,y	SET x,y
Read DATA statement	READ	READ	NONE	READ
Program notes	REM	REM	REM	REM
Return from SUBROUTINE	RETURN	RETURN	RETURN	RETURN
Produce random number	RND(x)	RND(x)	RND(x)	RND(x)
Run program	RUN	RUN	RUN	RUN
Run at line x	RUN x	RUN x	RUN x	RUN x
Save program on cassette	SAVE	SAVE	SAVE	CSAVE
Pause in program	WAIT	WAIT	PAUSE	NONE

Table I– Common statements and functions in Basic are compared for four popular computers—the Apple II, Commodore, Sinclair, and TRS-80.

**54 Hermaine Ave., Dedham, MA 02026*

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

When we organized the first *CQ* 160 Meter DX CW Contest some 25 years ago, the band was practically deserted and QRM was no problem. In later years as the band became more active and other organizations sponsored top-band contests, it became evident that a plan was needed if we were going to work the weak overseas DX stations. That is when "Mr. 160," Stew Perry, W1BB, came up with the brilliant idea of the DX Window, making 1825 to 1830 kHz off limits to stateside and VE stations during the hours that the band was open for DX. DX stations would make their calls in the DX Window and listen for an answer down in the lower portion of the band. This eventually worked out successfully if and when the stateside stations cooperated.

Last year in *CQ*'s 160 Contest it became evident that it was also necessary for DX stations to observe the DX Window operating plan. Certain DX stations solicited on-frequency contacts in the Window, and the resulting pile-up made it almost impossible to hear the weaker DX stations trying to establish a split-frequency operation.

We now feel that the situation is getting out of hand and more drastic measures are necessary. In our contest this year, on-frequency contacts made between 1825 and 1830 kHz will have no scoring value during the hours the band is open for DX. Stations that consistently ignore this regulation will be cited and will be open to disqualification. This applies to both stateside and overseas stations.

There is no legal regulation that prohibits you from operating in the 1825 to 1830 kHz section of the band, but we do have that regulation in our rules. We also have a sportsmanship clause, so if you are a participant in this year's *CQ* 160 Contest, govern yourself accordingly.

If you're not a contestant, please be as cooperative as you have been in the past and receive the gratitude of those who are trying to work that elusive DX in the Window.

Deadline for material for the April issue is January 15th, and February 15th for the May issue.

Have you checked the expiration date of your license lately?

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Jan.	12&13	"73" 40 & 75M SSB Contest
	Jan.	19-20	Texas QSO Party
*	Jan.	19-20	"73" 160 Meter SSB Contest
	Jan.	19-20	AGCW-DL QRP Contest
	Jan.	21-27	A5 ATV WAS SSTV Contest
	Jan.	**25-27**	**CQ WW DX 160M CW Contest**
	Jan.	26-27	French CW Contest
	Jan.	26&27	"73" 15 & 20M SSB Contest
	Jan.	27-28	Classic Radio Exchange
	Feb.	2-3	New Hampshire QSO Party
	Feb.	2-3	Vermont QSO Party
	Feb.	2-3	ZERO District QSO Party
	Feb.	9-10	QCWA CW QSO Party
	Feb.	9-10	YL-OM Phone Contest
	Feb.	9-10	West Coast 160M SSB
	Feb.	9-10	Dutch PACC Contest
	Feb.	16-17	ARRL DX CW Contest
	Feb.	**22-24**	**CQ WW DX 160M SSB Contest**
	Feb.	23	"73" RTTY Contest
	Feb.	23-24	YL-ISSB Phone QSO Party
	Feb.	23-24	French Phone Contest
	Feb.	23-24	YL-OM CW Contest
	Mar.	2-3	ARRL DX Phone Contest
	Mar.	9-10	QCWA Phone QSO Party
	Mar.	9-10	West Coast 160M CW
	Mar.	16-17	Bermuda Contest
	Mar.	16-17	YL-ISSB CW QSO Party
	Mar.	16-17	G-QRP Club QRP Contest
	Mar.	**30-31**	**CQ WW WPX SSB Contest**

**Covered last month.*

Complete rules were published in last month's issue. There are no changes from those used for the past two years. However, as indicated in last month's commentary, we are going to be checking this year's operation very closely, especially operation in the DX Window. Log checking will be done with the use of a computer, so taking credit for duplicate contacts will also be checked closely. Therefore, be forewarned. See the introduction to this column for more details.

Mailing deadline for CW entries is February 28th, and March 31st for the SSB section. Logs should be sent directly to the 160 Contest Director, Don McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32901. Of course, they can also be sent to *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801. (Please indicate CW or SSB on the envelope.)

CQ WW 160 Meter DX Contest

CW: Jan. 25–27 SSB: Feb. 22–24
2200Z Friday to 1600Z Sunday

Texas QSO Party

0000Z Sat. to 1800Z Sun., Jan. 19–20

This one is again organized by the West Texas ARC. The same station can be worked on each band and each mode, and mobiles in each county change. Single operator only.

Exchange: QSO no., and QTH. County for Texas stations. State, province, or country for others.

Scoring: Texas stations score 1 point per QSO on phone, 2 points if on c.w., fixed or mobile. (In-state contacts permitted for QSO and multiplier credit.) Non-Texans same as above. However, Texan phone mobiles are worth 5 points, c.w. mobiles 7 points.

Multiplier: Texans use states, VE provinces, DX countries, and Texas counties. Non-Texans use Texas counties (maximum of 254).

Frequencies: C.W.—3565, 7065, 14065, 21065, 28065. Phone—3940, 7260, 14280, 21370, 28600. Novice—3710, 7110, 21110, 28110.

Awards: Certificates to the top scorers in each state, VE province, and DX country, and top 10 Texas stations. There are also plaques for the overall winners in seven different areas: U.S., U.S. Novice, DX, VE, Texas fixed, mobile, and Novice stations.

All logs must be received by March 15th. This year they go to: Tom Horton, K5IID, 2708 Halifax Avenue, Odessa, TX 79762.

AGCW-DL QRP Contest

1500Z Sat. to 1500Z Sun., Jan. 19–20

This is the winter edition of this QRP Contest organized by the AGCW-DL. It's a c.w. only contest, all bands 10 to 160 meters. The same station may be worked on each band for QSO and multiplier credit.

There are five classes as follows:
A. Single Opr.— 3.5 watts or less.
B. Single Opr.—10 watts or less.
C. Multi-Opr.—10 watts or less.
D. QRO stations, over 10 watts.
E. S.w.l.'s

Multi-operator stations may operate the full 24 hours. All other classes must take a 9-hour break.

Exchange: RST, QSO no., and power input. Add X if transmitter is crystal controlled (550001/5X). QRO stations add QRO (579002/QRO).

Points: QSO with own country, 1 point. Other countries own continent, 2 points. DX outside own continent, 3 points. Crystal-controlled stations are limited to 3 crystals for each band, and take double above points for QSOs.

Multiplier: One for each country and one for each DX contact. For scoring purposes call areas in JA, PY, VE, VK, W/K, ZS are counted as multipliers.

Final Score: Total QSO points times the multiplier on that band. Add the sum of scores from each band.

Awards: Certificates to the first three places in each class on each band.

Say You Saw It In CQ

Use a separate log for each band. All entries must be received by the contest manager no later than 6 weeks after the end of the contest. They go to: Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Republic of Germany (include one IRC for results).

A5 ATV WAS SSTV Contest

0000Z Mon. to 2400Z Sun., Jan. 21–27

This year the 4th annual SSTV Contest sponsored by *A5 ATV Magazine* is a week-long affair. The objective is to contact U.S. states on video mode only. All contacts must be in video form with a minimum of callsign and RSV signal report, sent and received.

Each SSTV contact is worth 10 points regardless of location. Each new state worked is worth 100 points, and you pick up 500 points if you contact Alaska or Hawaii. Total points is your final score.

Advanced and Extras will be found on 3845, 7171, 14230, 21340, 28680; Generals on 3990, 7290, 21440, and 28680.

The top scorer gets a three-year subscription to *A5 ATV Magazine;* district leaders, a one-year subscription. All entrants will receive a special "gold" certificate. Logs go to Contest Mgr. Mike Stone, WB0QCD, *A5 ATV Magazine*, P.O. Box H, Lowden, IA 52255.

French DX Contest

CW: Jan. 26–27 SSB: Feb. 23–24
0600Z Saturday to 1800Z Sunday

This year's announcement from the REF showed several changes from last year's format. It's still the world working the French Europeans as well as other French countries, departments and territories all over the world, but independent countries were not listed this year. The French areas can usually be identified by the letter "F" in the prefix of their call.

Classes: Single operator and multi-operator. Multi-operator stations must remain on the same band at least 15 minutes. There is no time limit for single operator stations this year.

Exchange: RS(T) plus a three-figure QSO number starting with 001. French stations will also include two figures or letters identifying their department.

Points: One point per contact between stations in the same continent, 3 points if with other continents.

Multiplier: Each French European department (95) and each overseas department and territory worked, as well as French Army in West Germany, DA1 and DA2, Corsica 2A and 2B, and the Official Club Station, F6REF.

Final Score: Total QSO points from all five bands, 3.5–28 MHz times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each country. European single operators must make at least 100 QSOs; multi-operators 250 QSOs. All other areas 50 QSOs for single operator, 100 QSOs for multi-operators.

Stations making over 250 contacts must include a dupe check list with their logs. The usual disqualification rules for excessive duplicate contacts and other violations will be strictly enforced.

All entries must be received by March 1st for CW, and April 1st for SSB by the REF Contest Committee, 2, Square Trudaine, 75 009 Paris, France.

1984 French Contest Results

CW

W3ARK	28,120	K2SX	1,694
W9OA	16,107	W1OPJ	516
K2FE	10,707	NN3SI	432
W4KO	9,792	W9YCV	363
K4FPF	6,109	VO1AW	16,576
W8VSK	2,856	HK3/K3ZO	24,938

SSB

W2/F2YS	96,102	VO1AW	3,627
W5EIJ	126	VE2AFC	12

1984 PACC Contest Results

U.S.A.

*K1KI	9,288	KK3S	416
K1VUT	1,817	N3BNA	416
K1BV	1,330	*N4MM	1,638
W1WY	480	WX4A	1,470
K1GZM	132	K4FPF	1,100
N1CRD	66	N4NX	624
*K2SX	1,386	*KN6O	12
N2IT	1,040	*K8PYD	756
K2FE	484	W8CHV	722
WB2TKD	140	W8VSK	595
*W3ARK	2,340		

Canada

*VO1AW	3,663	VE3MRS	2,725
VO1PJ(QRP)	36	VE3FGL	1,974
*VE3JPP	3,036	*VE4MF	81

**An asterisk denotes certificate winner.*

"73" 15 & 20M SSB Contest

15M: 0000Z to 2400Z Sat., Jan. 26
20M: 0000Z to 2400Z Sun., Jan. 27

This is the first time for both these contests sponsored by *73 Magazine.* Each band is treated as a separate contest and requires separate entries.

There are two classes, single operator and multi-operator single transmitter. Single operator stations are limited to 16 hours of operation. Multi-operator stations can operate the full 24 hours. Off periods must be no less than 30 minutes each and indicated on your log and summary sheet.

Exchange: RS and QTH. State, province, or territory for U.S. and Canada; country for DX (including KH6 and KL7).

Points: Five points per QSO within own continent. Ten points per QSO for contacts outside own continent.

Multiplier: One for each U.S. state (48), each Canadian prov./terr. (13), and each DX country worked.

Final Score: Total QSO points times the total multiplier points.

Awards: Awards will be issued to the winners in each U.S. state, each Canadian prov./terr., and each DX country in both classes. (A minimum of 100 QSOs to be eligible.)

Duplicate contacts in excess of 2% of the final score and other infractions will be considered grounds for disqualification. Include a dupe and summary sheet and the usual signed declaration.

CQ WW 160 Meter DX Contest
C.W. January 25 - 27 S.S.B. February 22 - 24

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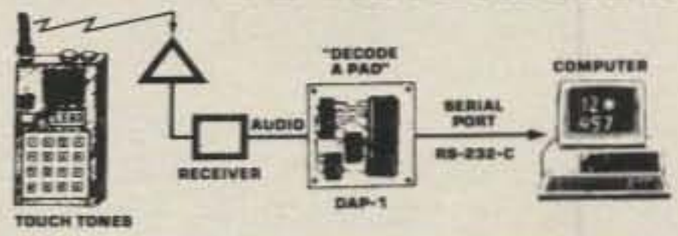
TOUCHTONE™ DTMF to RS-232-C 300 BAUD INTERFACE



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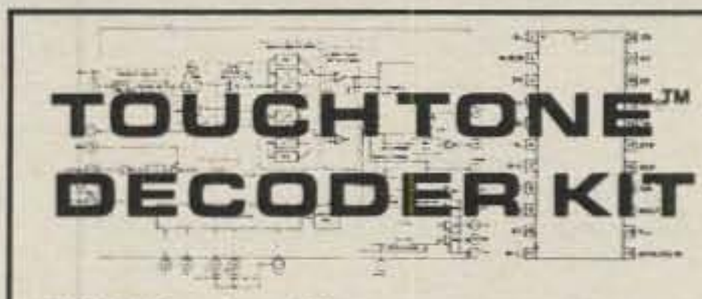

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CIRCLE 37 ON READER SERVICE CARD

Entry and log forms are available by sending a large s.a.s.e. to address below.

Mailing deadline is one month from end of each contest, and they go to: Chuck Ingram, WA6R, 44720 North 11th St. East, Lancaster, CA 93535.

Classic Radio Exchange

2100Z Sun. to 0400Z Mon., Jan. 27–28

This is the winter edition of this unusual event. The format is the same as it has been for the past several years. The object is to restore and operate older equipment with other like-minded hams, not required in the exchange, but a distinct advantage in the scoring. A classic radio is any equipment built since 1945 but at least 10 years old *(25 years would be more in line—ed.)*.

The same station may be worked on each band and each mode, and with different equipment combinations.

Exchange: Name, RS(T), QTH, receiver and transmitter type, and other interesting conversation.

Scoring: Multiply total QSOs from all bands and all equipment combinations used by the number of different receivers, transmitters, states, provinces, and DX countries worked on each band and each mode. Multiply that total by your classic multiplier: total years old of all receivers and transmitters used. Three QSOs minimum per unit. Multiply age by two if gear is a transceiver.

Frequencies: C.W.—60 kHz up from low edge of each band. Phone—3910, 7280, 14280, 21380, 28580. Novice—3720, 7120, 21120, 28120.

Send logs, comments, anecdotes, etc., to: Stu Stephens, K8SJ, 1407 Hollyrood Road, Sandusky, OH 44870. Include an s.a.s.e. for a copy of the newsletter with the results. *(Now if Stu would cut down the scoring requirements and include some kind of an award, he might lure some fellows from other activities—ed.)*

ZERO District QSO Party

1900Z Sat. to 0100Z Sun., Feb. 2–3
1500Z to 2400Z Sun., Feb. 3

This year's party is again being sponsored by the Davenport RAC. Stations outside the ZERO District will be working ZERO's only; ZERO's may contact anyone. The same station may be worked on each of the 5 bands, 10 through 80 meters, and on each mode. Mobiles in each county change.

Exchange: RS(T) and ARRL section. ZERO's will also include their county.

Scoring: Phone QSO's count 1 point; c.w. 2 points. ZERO's multiply total QSO points by the sum of ARRL sections, ZERO counties, and DX countries worked for their final score. All others use ZERO district counties for their multiplier.

Frequencies: C.W.—3560, 7060, 14060, 21060, 28060. Phone—3900, 7270, 14300, 21370, 28570. Novice—3725, 7125, 21125, 28125.

Awards: Certificates to the top scorer in each ARRL section, DX country, Novice/Tech., and Mobile. Plaques to the overall high scorer in ZERO land and outside the ZERO area.

Include a large s.a.s.e. for a copy of the results and a participation certificate. Mailing deadline is March 10th and logs go to: W0BXR, P.O. Box 10304, Davenport, IA 52803.

Vermont QSO Party

0001Z Sat. to 2400Z Sun., Feb. 2–3

This event is again being sponsored by the Central Vermont ARC. The same station may be worked three times per band—once each on phone, CW, and RTTY—for QSO points.

Exchange: RS(T) and QTH. County for VT; state, province, or DX country for others.

Scoring: One point per phone QSO; 5 points if on CW or RTTY. VT stations multiply total by (VT counties + states + VE provinces + DX countries) worked. All others use VT counties for their multiplier (maximum of 14). Work the club station W1BD and add 20 bonus points to your score.

VT Counties: AN, BN, CA, CN, EX, FN, GI, LA, OG, OL, RU, WA, WM, WR.

Frequencies: Phone—3910, 7230, 14260, 14320, 21360, 28570, 50110, 144.2 (no repeaters). CW—3540, 3720, 7040, 7120, 14040, 21040, 21140, 28040. RTTY—3620 and 90 kHz from lower edge of other bands.

Awards: Certificates to the top-scoring station in each state, VE province, and DX country, and each Vermont station submitting a log. There is an annual plaque to the highest scoring Vermont station.

The W/VT Award is available to stations working 13 of the 14 Vermont counties.

Official log forms are available by sending a large s.a.s.e. to KK1U. Mailing deadline for all entries is March 1st to: D. Nevin, KK1U, W. Hill, Northfield, VT 05663. Include an s.a.s.e. for a copy of the results.

New Hampshire QSO Party

1900Z Sat. to 0700Z Sun., Feb. 2–3
1400Z Sun. to 0200Z Mon., Feb. 3–4

The New Hampshire ARA is again sponsoring this year's party. The same station may be worked on each band and mode for QSO points, but the multiplier is counted once only. NH-to-NH contacts are permitted for QSO credit.

Exchange: RS(T) and QTH. County for NH; state, province, or DX country for others.

Scoring: One point per QSO for NH stations. Multiply total by sum of states + NH counties + DX countries worked (NH not a state; and W, VE, KL7, and KH6 not countries).

Others count 5 points per NH contact and multiply total by number of NH counties worked (maximum of 10).

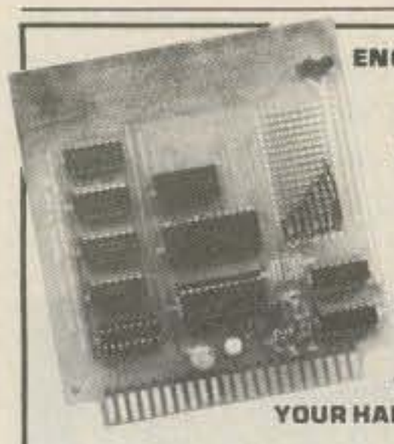
NH Counties: BP, CL, CE, CS, GN, HO, MK, RM, SD, SN.

In addition, there is a bonus of 20 points for all stations working club member stations WB1CAG, W1OC, WB1FFZ, K1RD, and W1WQM (maximum of 100 bonus points).

Frequencies: Phone—1875, 3975, 7235, 14280, 21380, 28575, 50115, 144205. CW—1810, 3555, 7055, 14055, 21055, 28055. RTTY—3625, 7085, 14085, 21085, 28085. Novice—3730, 7130, 21130, 28130.

Awards: Certificates to the top scorers in each NH county and each state, VE province, and DX country (minimum of 5 QSOs). The Concord Brasspounders are awarding a plaque to the top scorer in NH. W1JB is awarding the All NH Award to participants working all ten NH counties.

Mailing deadline for logs is March 15th to: Great Bay Radio Assn., P.O. Box 911, Dover, NH 03820. Include a large s.a.s.e. for a copy of the results.



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- Some examples you can control include the Pro-Search® Rotator (rotate beam remotely), ICOM IC-701 or ICOM IC-211 when using the RM-2 controller, ICOM 7950 & 751, Azden PCS 4000, handhelds such as Yaesu FT-208, FT-708, ICOM IC-02AT, and many more.
- Anything you can do manually with your 16 digit keypad, the RAP-1 will do remotely using audio touch tones from any source.
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- Hook eight wires (4 rows and 4 columns) in parallel with the existing keypad of the radio you wish to control remotely. Connect audio from any source, 12 volts D.C. and **you are in control.**
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- Detailed interface diagrams and instructions included with purchase. Interface cable for Pro-Search® $9.95 (plugs in acc. socket)

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CIRCLE 44 ON READER SERVICE CARD

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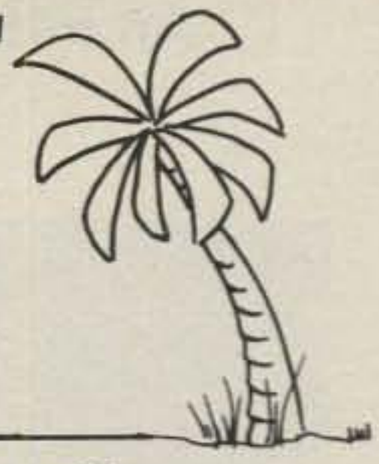

- Antenna Presentation
- DX Forum & Dinner
- ARRL & CAVEC VE Programs
- Packet Radio Forum
- License Exams
- Organizational Meetings
- New Product Exhibits
- Hamboree Dealer Specials
- Mammoth Swap Shop
- Activities for Non-Hams
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CIRCLE 57 ON READER SERVICE CARD

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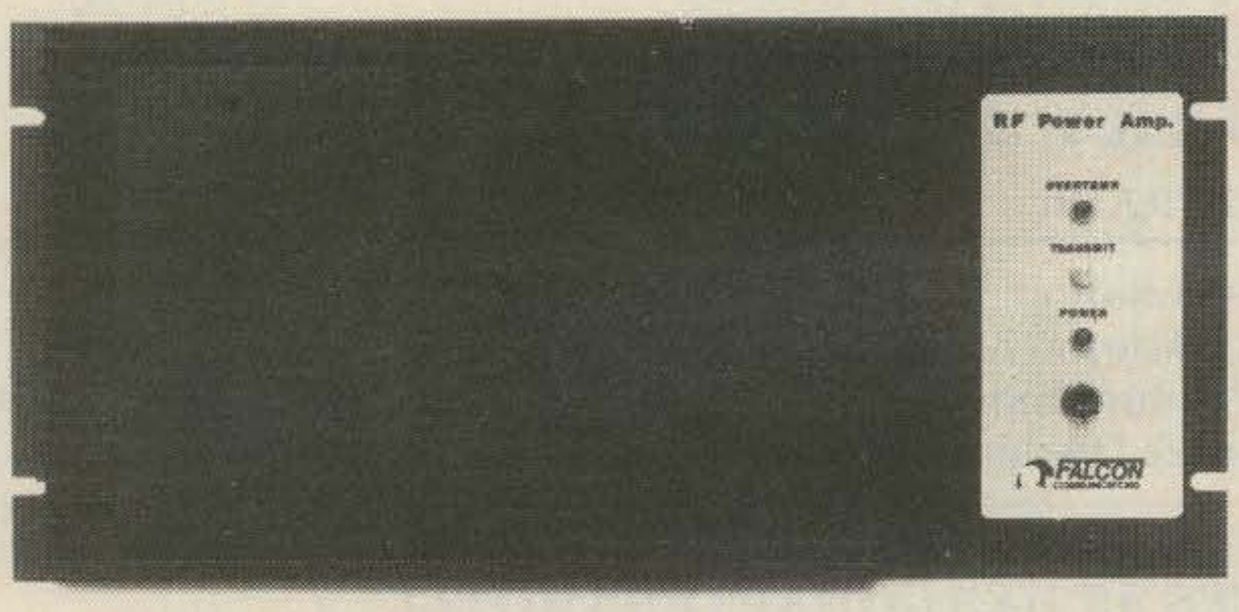
Built For Those Who Demand Quality.



4111: 2 Meter Power Amplifier
2 Watt Input - 30 Watt Output
20 Watt Input - 100 Watt Output

4112: 220 MHz Power Amplifier
2 Watt Input - 25 Watt Output
25 Watt Input - 100 Watt Output

4114: 2 Meter Power Amplifier
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These basic amplifers, with the low noise advantages of MOSFETs, require a 12-16 Vdc power source. Mounted on an 8¾" rack panel with a large heat sink, they are designed for continuous duty at full power output when cooled with a small, customer supplied, fan. Mounting provisions and control thermostat are supplied.

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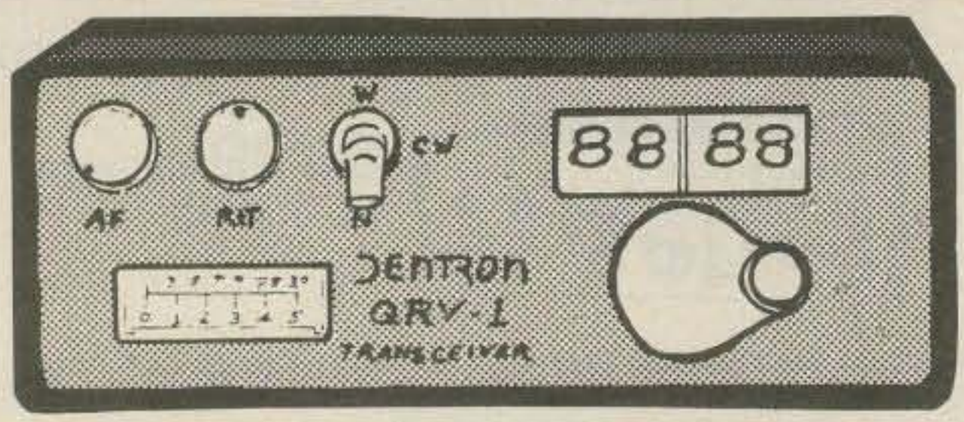
Dentron QRV-1



Specifications QRV-1

- All solid state construction
- Four-place digital display
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- Direct conversion receiver
- CW narrow and wide positions for receive
- Receiver sensitivity: 0.5 uV 10 dBsn/N

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- **Ability to operate various types of high/medium and short wave transmitter systems with power outputs of up to 500 kw.**
- **Ability to service, maintain, and install transmitter and receiver systems and associated equipment.**
- **FCC License and experience in a broadcast facility highly desirable.**
- **Education may be substituted for experience.**

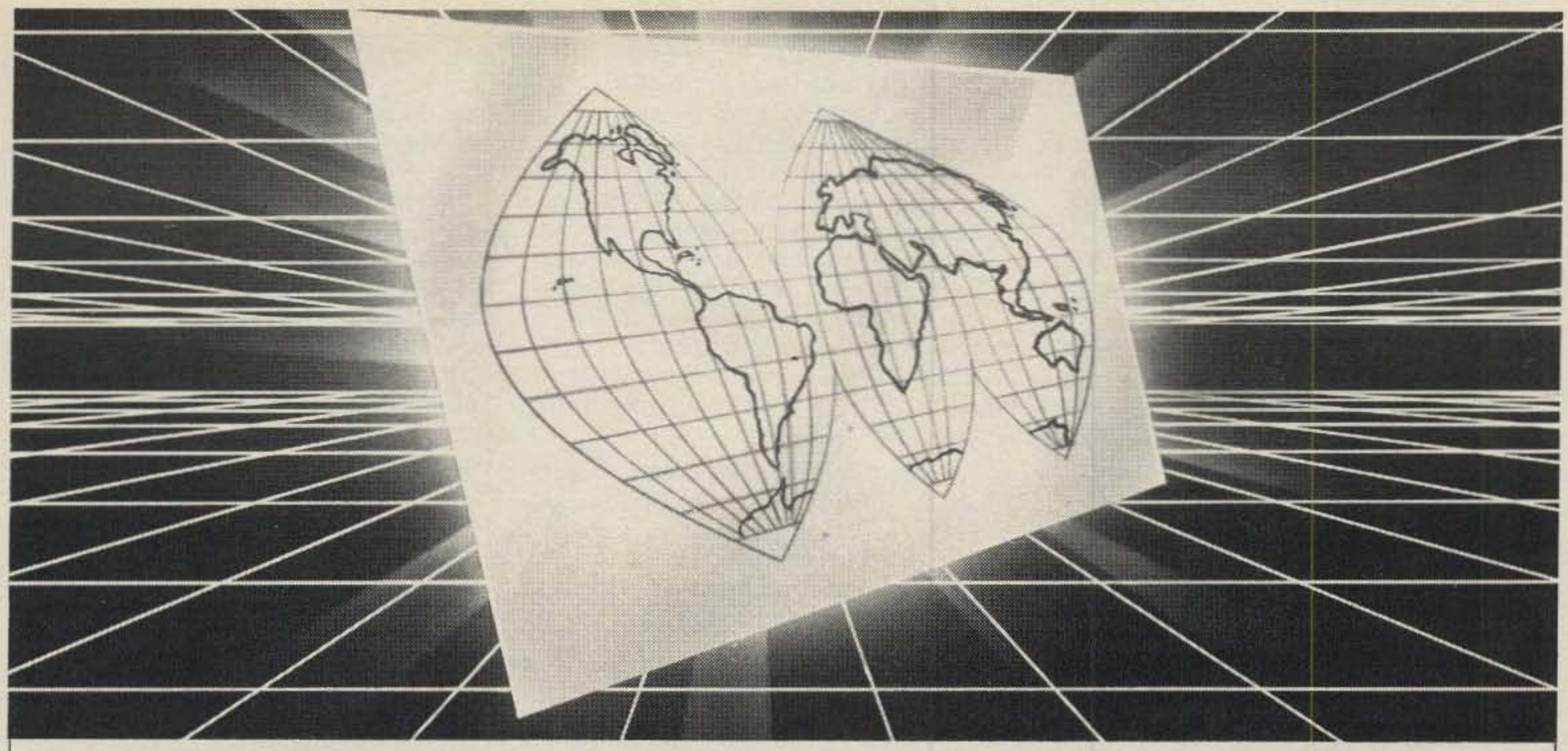
Salary ranges from $23,199 to $25,489 depending upon qualifications.

Send resume to:

VOA VOICE OF AMERICA
Voice of America
Suite C-12
Post Office Box 1625, Washington, DC 20013

US citizenship required; a thorough background inquiry may be necessary. Voice of America is an equal opportunity employer.

CIRCLE 40 ON READER SERVICE CARD



The 29th Annual CQ World Wide WPX Contest

S.S.B.: March 30–31, 1985
C.W.: May 25–26, 1985

Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

I. Contest Period: Only 30 hours of the 48 hour contest period permitted for Single Operator stations. The 18 hours of non-operating time may be taken in up to 5 periods anytime during the contest, and must be clearly indicated on the log. Multi-operator stations may operate the full 48 hours.

II. Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III. Bands: The 1.8, 3.5, 7, 14, 21, and 28 MHz bands may be used.

IV. Type of Competition: 1. Single Operator (a) All Band, (b) Single Band. 2. Multi-operator, All Band *only*. (a) Single Transmitter (only one transmitter and one band permitted during the same time period, defined as 10 minutes, no exception), (b) Multi-Transmitter (one signal per band permitted). **NOTE:** All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitter.

V. Exchange: RS(T) report plus a progressive three-digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000.) Multi-transmitter stations use separate numbers for each band.

VI. Points: Contacts between stations:

1. **North America Only**

A) Contacts outside of North America count 3 points on 28, 21, 14 MHz, and 6 points on 7, 3.5, 1.8 MHz.

B) Contacts with other North American countries count 2 points on 28, 21, 14 MHz, and 4 points on 7, 3.5, 1.8 MHz.

C) Contacts within own country count **0** points but are permitted for prefix multiplier credit.

2. **Europe, Asia, Africa, Oceania, S. America**

A) Contacts outside of own continent count 3 points on 28, 21, 14 MHz, and 6 points on 7, 3.5, 1.8 MHz.

B) Contacts with other countries on own continent count 1 point on 28, 21, 14 MHz, and 2 points on 7, 3.5, 1.8 MHz.

C) Contacts within own country count **0** points but are permitted for prefix multiplier credit.

VII. Multiplier: The multiplier is determined by the number of different prefixes worked. A **"PREFIX"** is counted once during the entire contest regardless of how many times the same prefix is worked.

A **"PREFIX"** is considered to be the three letter/number combination which forms the first part of an amateur radio call (N1, W2, WB3, K4, AA6, WD8, 4X4, DL7, G3, IT9, KH2, AL7, NP2, WP4, 9M2, CT9, 4J9, PY7, VK4, JE3, VE3, Y32, Y33, Y45, AN8, AB8, H44, KT4, etc.). **A station in a call area different than that indicated by its call sign is required to sign portable.** The portable prefix would be the multiplier. Example: W8IMZ/4 would count for prefix W4 only and W8IMZ/LX would count for prefix LX**0** only.

Special event, commemorative, and other unique prefix stations are also encouraged to participate.

VIII. Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score, QSO points on the band multiplied by the number of different Prefixes worked. See VII.

2. Multi-Operated stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A station may be worked once on each band for QSO point credit. However, prefix credit can be taken only **once** regardless of the number of different bands on which the same station and/or prefix has been worked during the entire contest.

IX. QRPp Section: (Single Operator Only). Power must not exceed 5 watts output to qualify for QRPp section competition. **You must denote QRPp on the summary sheet and state the actual maximum power output used for all claimed contacts.** Results will be listed in a separate QRPp section and certificates will be awarded to each top scoring QRPp station in the order indicated in Section X. These certificates will be marked QRPp and will show your power output. QRPp stations will be competing only with other QRPp stations for awards. All other information contained in these rules is applicable to this section.

X. Awards: Certificates will be awarded to the highest scoring station in each category listed under Section IV.

1. In every participating country.

2. In each call area of the United States, Canada, Australia, and Asiatic USSR.

All scores will be published. However, to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single award **only**. If a log contains more than one band, it will be judged as an all band entry, unless specified otherwise. However, a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

XI. Trophies, Plaques and Donors:

S.S.B.
Single Operator, All Band

WORLD - North Florida DX Assn.
U.S.A. - Bob Epstein, K8IA
CANADA - Ed Sleight, K4SB
CARIB./C.A. - Arturo Gigante, Jr., HI8GB
EUROPE - Bernie Welch, W8IMZ
*JAPAN - Palm Garden Radio Club
SO. AMERICA - Ron Moorefield, W8ILC
OCEANIA - Down Under DX'ers
AFRICA - Southeastern DX Club
WORLD QRPp - Dayton A.R.A.

Single Operator, Single Band

WORLD - John N. Reichert, N4RV
U.S.A. - Richardson Wireless Klub
(Joe Johnson, W5QBM Memorial)
U.S.A. - 7 MHz - William Diggins, WA8LXJ
*CANADA - Gene Krehbiel, VE7KB
JAPAN - Ken Ruddock, K6HNZ
*JAPAN - 28 MHz - Joe Arcure, W3HNK & Toshi Kusano, JA1ELY (Terry Appleton, W4GSM Memorial Award)
*WORLD - 21 MHz - Lee Wical, KH6BZF
WORLD - 7 MHz - William Diggins, WA8LXJ
WORLD - 1.8 MHz - Arch Doty, Jr., K8CFU/4

Multi-Operator, Single Xmtr.

WORLD - Mike Badolato, W5MYA

Multi-Operator, Multi-Xmtr.

WORLD - Henry Thel, VE7WJ
U.S.A. - Bert Curwen, KL7IRT

Contest Expedition

WORLD - Kansas City DX Club

• • •

C.W.
Single Operator, All Band

*WORLD - Canadian DX Assn.
U.S.A. - Steve Bolia, N8BJQ
*CANADA - Canadian A.R.F.
*JAPAN - Palm Gardens Contest Club
OCEANIA - Tom Morton, KT6V

Single Operator, Single Band

WORLD - Pedro Piza, Jr., NP4A
(Pedro Piza, Sr., KP4ES Memorial)
U.S.A. - Kansas City DX Club
U.S.A. - 7 MHz - Dennis Younker, NE6I
ASIA - Bruce Frahm, KØBJ
WORLD - 3.5 MHz - Lance Johnson Eng.

Multi-Operator, Single Xmtr.

WORLD - Ron Blake, N4KE
U.S.A. - Austin Regal, N4WW
*CANADA - Tehrahedral Contest Circle
EUROPE - Jonas Bjarnason, TF3JB

Multi-Operator, Multi-Xmtr.

WORLD - North Florida DX Assn.
NORTH AMERICA - Dick Weber, K5IU

Contest Expedition

WORLD - Ed Roller, K4IA

Club (S.S.B. & C.W.)

*WORLD - Canadian DX Assn.
(Bud Abraham, VE1VR Memorial)
U.S.A. - Northern Ohio A.R.S.

**Donor is responsible for this trophy.*

Trophy and Plaque winners may win the same award *only once* within a **TWO** year period. This does not apply to any QRPp, Club, Expedition or *CQ* Special Awards. A station winning a World Trophy will not be considered for a sub-area award. That Trophy will be awarded to the runner-up for that area.

XII. Club Competition: A trophy will be awarded each year to the club or group that has the highest aggregate score from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area. **(Exception: DXpeditions especially organized for operation in the contest and manned by members.)** Indicate your club affiliation. To be listed, a minimum of three logs must be received from a club.

XIII. Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Prefix multipliers should be entered only the FIRST TIME they are contacted.

3. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated. Computer logs must be checked for typing accuracy.

4. An alphabetical/numerical check list of claimed PREFIX multipliers must be sent along with your contest log. (A prefix is counted one time only.)

5. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition, and the contestant's name and mailing address in BLOCK LETTERS.

Also submit a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.

6. Official log and sample summary sheets are available from *CQ*. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available, you can make your own with 40 contacts to the page.

XIV. Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts, unverifiable QSO's or multipliers will be deemed sufficient cause for disqualification. Actions and decisions of the **CQ WPX Contest Committee** are official and final.

XV. Deadline: All entries must be postmarked no later than **May 10, 1985** for the S.S.B. section and **July 10, 1985** for the C.W. section. **Indicate S.S.B. or C.W. on the envelope.** From isolated areas the deadlines can be made more flexible.

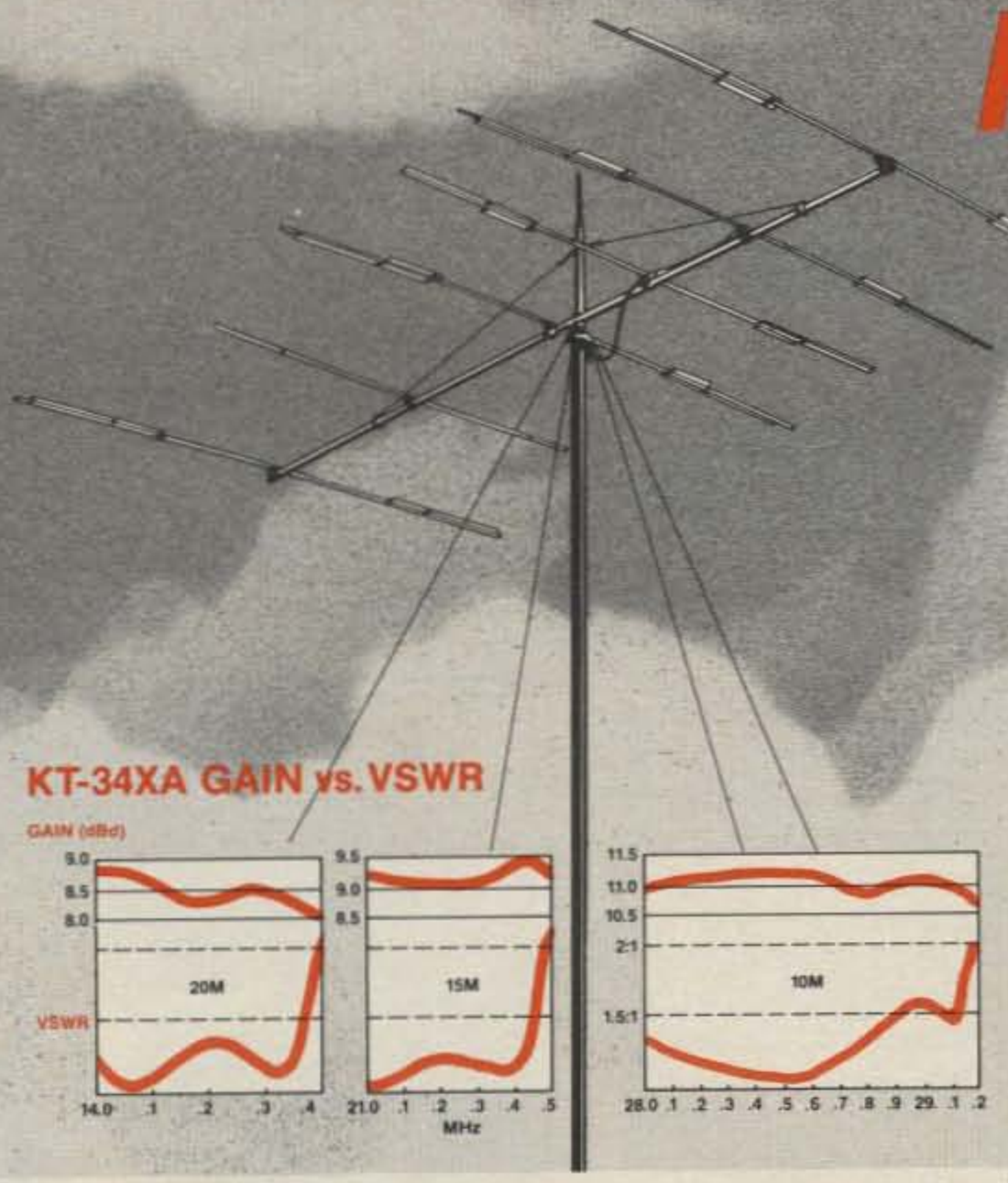
All logs go to: CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, NY 11801 U.S.A.

Questions pertaining to the WPX Contest can be sent to: WPX Contest Director, Steve Bolia, N8BJQ, via CQ Magazine, 76 North Broadway, Hicksville, NY 11801 U.S.A.

Please remember to send in early for the WPX Contest Logs and Summary Sheets.

Say You Saw It In CQ

KT-34XA Triband Performance



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Takes you through the sunspot lull with solid QSO's and exciting DX.

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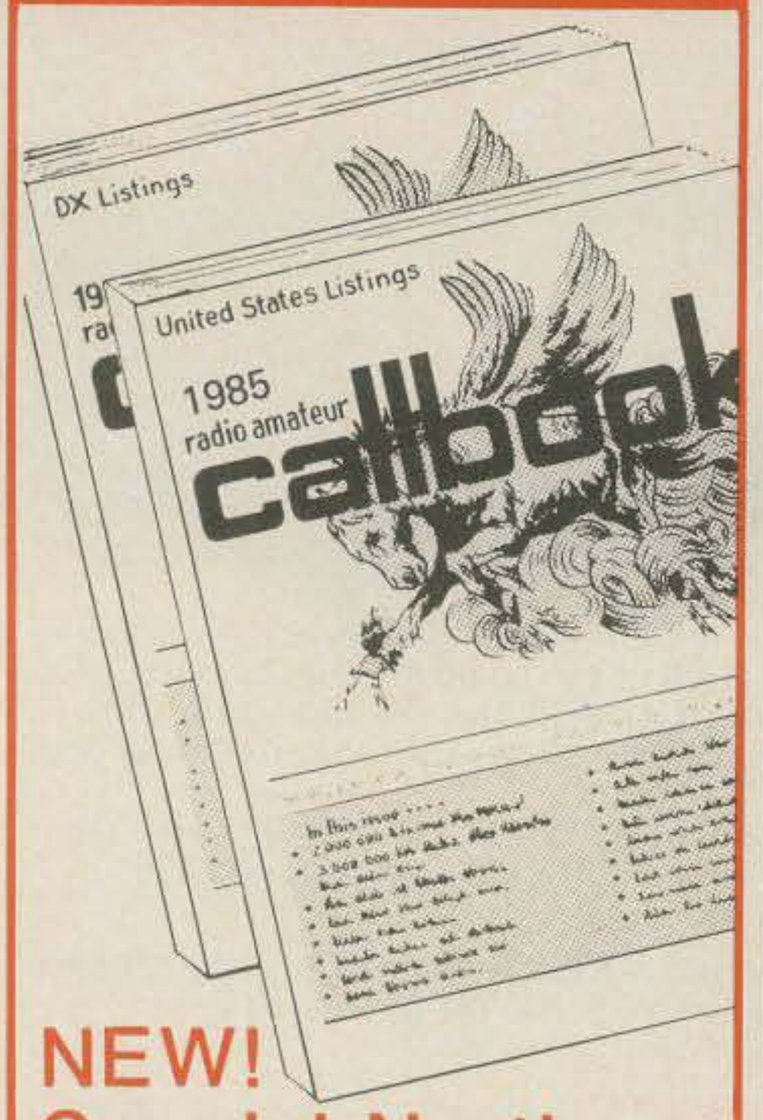
1985 CALLBOOKS



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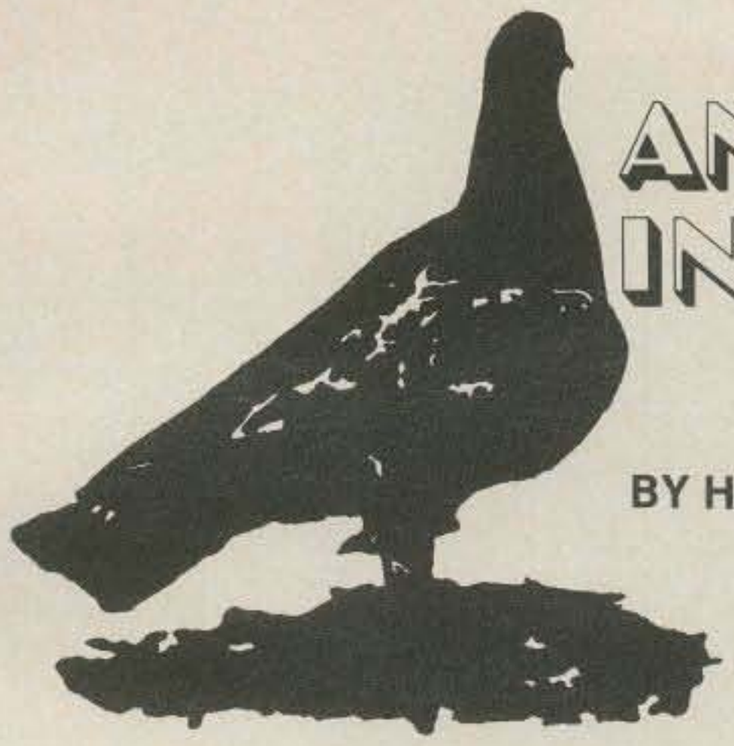
Training pigeons for the Allies during WWII was W6UVW's entree into the RSARS 30 years later.



AN AMERICAN IN THE RSARS

BY HAROLD M. ROWLETTE*, W6UVW

From 1942 to 1945, I served with the 278th Signal Pigeon Company of the Signal Corp, Ninth Army, in the States, Europe, and specifically England. As a company, we were responsible for the training, feeding, care, and handling of homing pigeons. They were used as "silent messengers" from post to post to transmit vital communications when radio silence was required. We were also responsible for the retraining of German pigeons captured by the Allied troops.

In the course of this duty, I worked closely with the British Royal Signal Corps in transmission of important dispatches between the Allies.

After the war, I returned to California and civilian life. In 1957 I became interested in amateur radio and obtained my Novice ticket. After some experience, I acquired my Tech license, and on February 28, 1979, I was granted a General Class ticket. I will always consider this my present from the FCC, coming two days after my 68th birthday.

The July 1973 issue of *CQ* contained a letter by Capt. Jack Cooper, G3DPS, on the procedure of becoming a member of the Royal Signal Amateur Radio Society (RSARS). Due to my previous experiences in the war with the Royal Signals Corp, I submitted the appropriate paperwork and received my certificate of membership later that year. Since that time I have been accorded Life Membership, my number being 0406/W6UVW.

After retirement from the California Highway Patrol, my wife and I took a trip to Europe in September/October 1980. The European tour was of WWII battlefields, and we spent some time at Volkenberg, Holland, where I had been stationed with the pigeon company in a very ancient castle.

Harold M. Rowlette, W6UVW, at his Kenwood 120S station.

Our time in England was divided between a tour of western England, time in London, and three days in Darlington. While in London, we were privileged to meet with Capt. (tot) Jack Cooper, G3DPS. We had a very nice talk, and he was glad to have a chance to talk with an American amateur face to face.

We then travelled to Darlington via the excellent British rail system. The RSARS is headquartered in Darlington, and we visited while in the area. After a local bus ride to Catterick Garrison, we were warmly welcomed by Sgt. Paul Walker, G4DBV, and Major Ray Webb, G3EKL. I had a chance to work about five English amateurs, and I now know how some DX station operators feel when they get calls stacked up and hope to work as many as possible. Later Sgt. Walker drove us back to Darlington and we then returned home.

I would very much appreciate the opportunity to talk with anyone interested in the RSARS or anyone connected with the pigeon corp. Please feel free to write to me.

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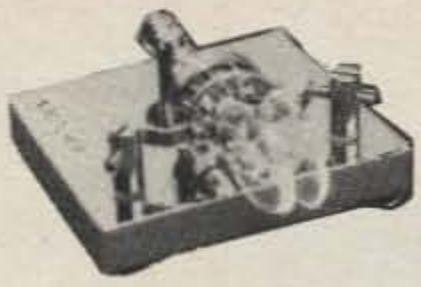

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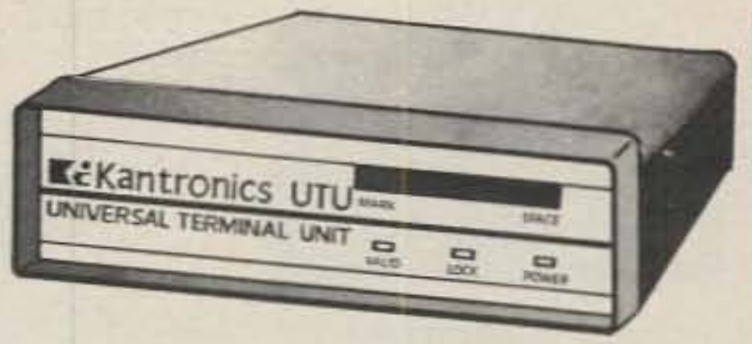

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B215	2M	Yes	2W	150W	22A	$259
B108	2M	Yes	10W	80W	10A	$159
B1016	2M	Yes	10W	160W	20A	$249
B3016	2M	Yes	30W	160W	17A	$199
C22	220	No	2W	20W	5A	$ 79
C106	220	Yes	10W	60W	10A	$179
C1012	220	Yes	10W	120W	20A	$259
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RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
RS50A	37	50	199
RS50M	37	50	229

MODEL RS-50A

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HG54HD	54 ft.	16 sq. ft.,	$1629
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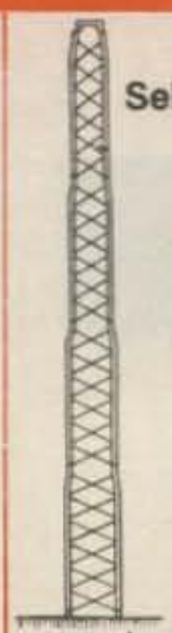
Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



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HBX48	48 ft	10 sq ft	303	$399
HBX56	56 ft	10 sq ft	385	$489
HDBX40	40 ft	18 sq ft	281	$379
HDBX48	48 ft	18 sq ft	363	$469

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

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These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

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- **Complete with base and rotor plate**
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WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$999
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
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DX86 (Motorized)	86.0 ft	23.0 ft	25 sq ft	$7200	Call

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$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
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- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

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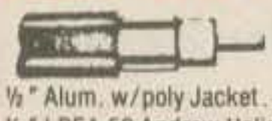
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield
- Low Loss Foam Dielectric
- Non-contaminating Vinyl Jacket

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
¾" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™



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select connectors below.

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Bumper Mounts - Springs - Folding Masts in Stock!

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15-3CD	$119	15-4CD	$129
20-3CD	$199	20-4CD	$279
40-2CD	$289	D40	$149

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220B	$ 95	424B	$ 79

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TH3JRS 3-el Triband Beam	$189
TH2MK3S 2-el Triband Beam	$179
205BAS 5-el 20-mtr Beam	$349
155BAS 5-el 15-mtr Beam	$199
105BAS 5-el 10-mtr Beam	$129
204BAS 4-el 20-mtr Beam	$259
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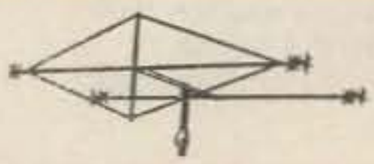
TA-33JR 3-el Triband Beam	$189
TA40KR 40 mtr Kit for TA33	$119



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- Wind Area - 1.5 sq ft
- Boom - 54 in. long
- 1200W P.E.P. Input

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80m-1 80-mtr Rotatable Dipole	$595
40m-1 40-mtr Rotatable Dipole	$179
40m-2 2-el 40-mtr Beam	$309
40m-3 3-el 40-mtr Beam	$459
40m-4 4-el 40-mtr Beam	$649
2m-13LBA 13-el 2-mtr Beam	$79
2m-14C 14-el 2-mtr Satellite Antenna	$89
2m-16LBX NEW-16-el 2-mtr Beam	$99
2m-22C NEW-22-el 2-mtr Satellite Antenna	$119
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Standard 8 cond cable $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
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10 ft Stack Sections

20G $37.50 25G $46.50
45G $107.50 55G $127.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

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FK2558	58 ft	13.3 sq ft	$ 899
FK2568	68 ft	11.7 sq ft	$ 959
FK4544	44 ft	34.8 sq ft	$1159
FK4554	54 ft	29.1 sq ft	$1259
FK4564	64 ft	28.4 sq ft	$1359
25G Foldover Double Guy Kit			$199
45G Foldover Double Guy Kit			$229

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

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3/16" EHS Guywire (3990 lb rating)	$.13/ft
1/4" EHS Guywire (6000 lb rating)	$.16/ft
5/32" 7 × 7 Aircraft Cable (2700 lb rating)	$.12/ft
3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	$.35
1/4" CCM Cable Clamp (1/4" Cable)	$.45
1/4" TH Thimble (fits all sizes)	$.30
3/8EE (3/8" Eye & Eye Turnbuckle)	$5.95
3/8" EJ (3/8" Eye & Jaw Turnbuckle)	$6.95
1/2" EE (1/2" Eye & Eye Turnbuckle)	$8.95
1/2" EJ (1/2" Eye & Jaw Turnbuckle)	$9.95
3/16" Preformed Guy Grip	$1.99
1/4" Preformed Guy Grip	$2.49
6" Diam - 4 ft Long Earth Screw Anchor	$12.95
500D Guy Insulator (5/32" or 3/16" Cable)	$1.39
502 Guy Insulator (1/4" Cable)	$2.49
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

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HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
HPTG4000 Guy Cable (4000 lb rating)	$.43/ft
HPTG6700 Guy Cable (6700 lb rating)	$.69/ft
9901LD Cable End (for 2100/4000 cable)	$6.95
9902LD Cable End (for 6700 cable)	$7.95
Socketfast Potting Compound (does 6-8 ends)	$12.95

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.25 in Wall	$69	$129	$189	$249

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Announcing

● **Wireless Institute of Australia** - A commemorative callsign, VI3WI, will be on the air until April 30. All DX bands and modes will be used, and a special QSL will be available either direct or through the VK3 QSL Bureau. An award certificate is also available for contact with Victoria between November 1984 and April 30, 1985. Contact (SWLs log) one station in VK3 to qualify. A QSL for the contact and a congratulatory message for Victoria's 150th anniversary, plus $2.00 (or the equivalent) should be sent to Victoria 150 Award, Wireless Institute of Australia, 412 Brunswick St., Fitzroy 3065 Victoria, Australia.

● **Oak Park, MI Swap-n-Shop** - The Oak Park, Michigan ARC will hold its annual Swap-n-Shop on Sunday, January 6 from 8 am to 3 pm at Oak Park High School. Novice exams will be given at 11 am. Refreshments and free parking. Talk-in on 146.52. Admission is $2.75. Tables available for $8.00. For more information, send s.a.s.e. to: Oak Park ARC, c/o Jeff Smith, N8FMQ, 459 Madison, Birmingham, MI 48008.

● **Midwinter Swapfest** - The 'Original' Annual Midwinter Swapfest will be held on Saturday, January 12 at the Waukesha Co. Expo Center Forum at 8:00 am. Admission: $2.00 in advance, $3.00 at door. Tables (4 ft.) $4.00 at door. Sponsored by the West Allis Radio Amateur Club. For tickets write to WARAC Swapfest, P.O. Box 1072, Milwaukee, WI 53201 (s.a.s.e.)

● **Tuscaloosa, AL Special Event** - On Saturday, January 12 KE4TN will commemorate the 63rd Anniversary of the Tuscaloosa Jaycees. Operation will be from 1300 to 2300Z and a certificate will be offered to all contacts. To receive the certificate send your QSL card only (no s.a.s.e. needed) to The Tuscaloosa Jaycees, P.O. Drawer L, Tuscaloosa, AL 35404, or the *Callbook* address of KE4TN.

● **Richmond Frostfest** - The Eighth Annual Richmond Frostfest will be held on Sunday, January 13 at the Virginia State Fairgrounds from 8:30 am to 3:30 pm. General admission $4.00. Flea Market spaces $3.00 without table; $7.00 with 8 ft. table (deadline January 10). Sponsored by the Richmond Amateur Telecommunications Society. Write Richmond Frostfest, P.O. Box 1070, Richmond, VA 23208, or call Bill Scruggs, N4DDM, 804-272-8206.

● **Amateur Radio Exams** - The Eastern AZ Amateur Radio Society will hold amateur radio examinations on Saturday, January 26 from 9 am to 3 pm. Exams will be given at the National Guard Armory, 4001 First Ave. in Safford. Prior registration deadline is January 21. Send a completed form 610, a copy of any license, and a $4.00 registration fee to EAARS, P.O. Box 402, Thatcher, AZ 85552. For more information, call Richard, N7DZH, at (602) 428-6560 from 7 am to 3:30 pm.

● **West Virginia QSO Party** - Sponsored by the West Virginia State AR Council, this event will be held from 1700Z Jan. 26 until 1700Z Jan. 27. Single operator only. Exchange signal report, serial number, and QTH (county for WV stations; state or country for others). Suggested frequencies: Phone—10 kHz up from lower General band edges; CW—35 kHz up from low end; Novice—35 kHz from lower band edge. Count 1 point per QSO. WV stations multiply by total WV counties, states, and countries worked; others multiply by total WV counties worked. Multiply score by 1.5 if running 200 W or less. Mail logs by Feb. 11 (include large s.a.s.e. for results) to K8BS, P.O. Box 1694, Charleston, WV 25326.

● **Yonkers Electronics Auction** - This auction will take place on Sunday, January 27 at Lemko Hall, 556 Yonkers Ave., Yonkers, NY from 9 am to 3 pm. Admission $3.00. Auction starts at 10 am. Sponsored by the Yonkers ARC.

● **AFCEA Amateur Radio Luncheon** - In conjunction with the Armed Forces Communications and Electronics Association's 6th Western Conference (January 29–31), a luncheon will be held on Thursday the 31st. Following the luncheon will be a forum. For more information, contact John W. Browning, W6SP, 6202 Lochvale, Palos Verdes, CA 90274 (213-544-2543).

● **Dayton Hamvention '85** - This year's Dayton Hamvention, the largest amateur radio show of the year, will be held on April 26–28, so make your plans early!

Autostart on RTTY Addition

In the article "Autostart on RTTY" by Byron Kretzman, W2JTP, in the November 1984 issue, the parts list for fig. 4 was inadvertently left out. We have reproduced it here.

Symbol	Component	Radio Shack Cat. No.
CR1	1 amp 50 PIV Silicon Diode Rectifier	276-1161
CR2	1N4001 1 amp 50 PIV Silicon Diode	276-1101
C1	2200 mF, 35 Electrolytic	272-1021
C2, C3	0.1 mF, 250V Metal Film	272-1053
F	½ amp, Fast-acting Pigtail Fuse	270-1221
Q	+ 12 Volt Fixed Regulator	276-1771
R	2200 ohms, ½ watt	271-027
T	12.6 V, 300 mA Transformer	273-1885

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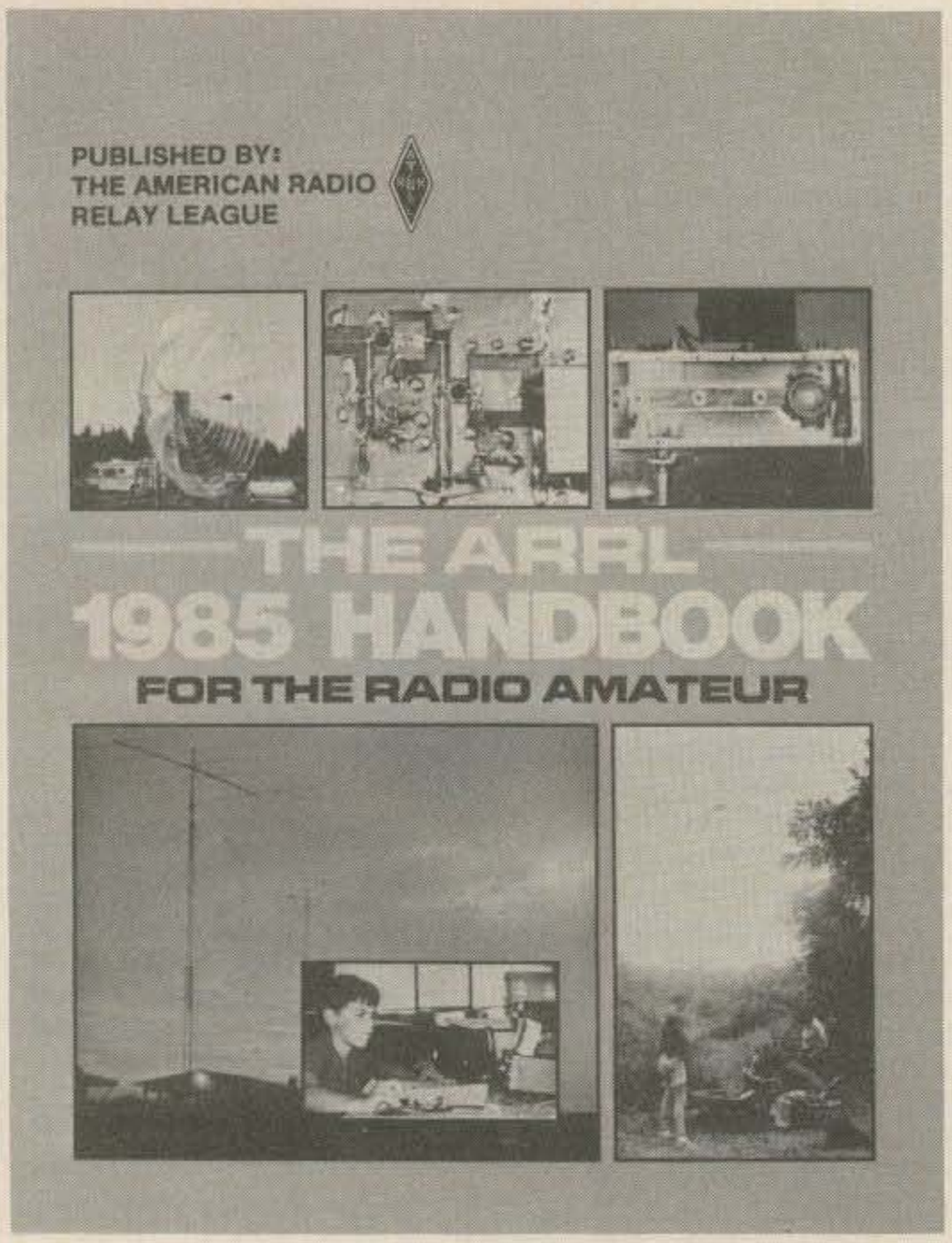

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CQ SHOWCASE

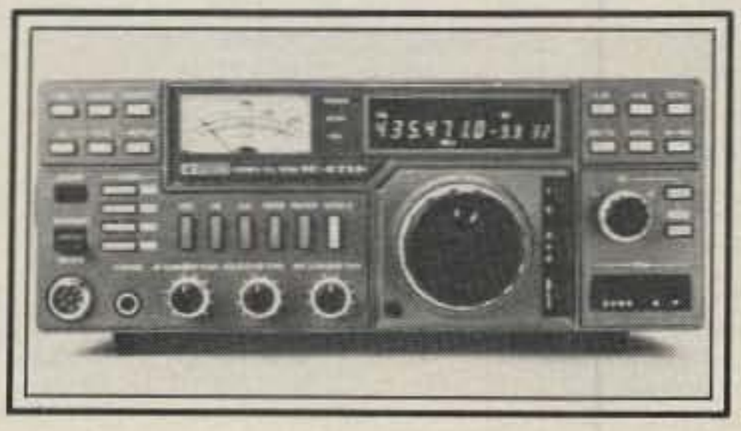
Heathkit Video Monitor

The HVM-122A kit monochrome video monitor with a non-glare 12-inch diagonal screen and amber phosphor CRT is for use with most popular home computers. The monitor accepts an NTSC composite video signal and has a screen capacity of up to 25 lines containing 80 characters each. The HVM-122A is specially equipped with a 40–80 character switch so that character size can be increased to accommodate the video format of a computer that has a 40-column display output. The HVM-122A monitor kit has a 15 MHz bandwidth and a 30 nanosecond rise time. The monitor features a 100% modular chassis with front external controls including power, black level, contrast, horizontal and vertical hold, and vertical height. An LED indicator shows when power is turned on.

The HVM-122A operates on 120 VAC at 60 Hz at 26 watts. It measures 12″H × 12.9″W × 12″D and weighs 14 pounds. For more information, contact Heath Company, Benton Harbor, MI 49022, or circle number 102 on the reader service card.

ICOM IC-471H Transceiver

The IC-471H 430–450 MHz, 75 watt transceiver has the following features: FM, SSB, CW modes; 32 full-function tunable memories storing frequency, offset, offset direction, and tones; 32 built-in subaudible tones, front panel selectable; 10 Hz tuning increments; 1 MHz up/down buttons; scanning of memories, memory modes, or band; all mode squelch; easy-



to-read fluorescent display; "S" meter plus discriminator meter; RIT readout with ±9.9 kHz range; dual VFO's; and preamp switch for controlling external, mast-mounted preamps.

Size is 4½″H × 11½″W × 13¼″D. The IC-471H uses 12 VDC power and may be supplied from an external source (IC-PS15 or IC-PS30, optional) or from an optional internal AC power supply (IC-PS35). Price of the unit is $1099. For more information, contact ICOM America, Inc., 2112 116th Ave. NE, Bellevue, WA 98004, or circle number 101 on the reader service card.

Cetec Vega DTMF Mobile Encoder

The Model SE-714 mobile encoder, when triggered, produces a three to six digit DTMF ANI (automatic number identification) message plus a two digit status

message. The ANI message is field-programmable by means of a diode matrix. The status message is operator-programmable through two panel-mounted back-lit thumbwheel switches, allowing up to 100 different status messages. The SE-714 has two timing features, one inhibiting the message for a timed period after message transmission, and the other automatically sending the message after a timed period of continuous transmission.

The SE-714 expands channel capacity by replacing mobile-to-base voice responses with a complete ANI plus status message that requires only a ¾ second transmission time. The message may be initiated by PTT (or off-hook) operation or by a manual pushbutton on the front panel. For more information, contact Cetec Vega, 9900 Baldwin Place, El Monte, CA 91731, or circle number 104 on the reader service card.

Datak Corp. "Circuit-Fix™"

"Circuit-Fix™" is a repair kit with adhesive copper donuts, foil, knife, and a patented (pending) combination clamp and cutting guide. The clamp-guide allows easy cutting of conductor traces as thin as 0.012 inch, maker says. The tool is opened with one hand while adhesive copper foil is slipped in place. The width is adjusted by hand while checking with a machinist's scale. The clamp-guide holds the foil, gives a straight edge, and keeps the blade vertical during the cut. Repairs are made by pressing the trace onto the PC board, cutting off the excess with a knife, and adding donuts (terminal pads) where required. Soldering ensures electrical continuity.

The CF-1 "Circuit-Fix" kit is available for $21.95. The CF-2 "308 Assorted Donuts" and the CF-3 "Two Sheets Copper Foil" cost $4.00 each. For more information, contact Datak Corp., 65 71st St., Guttenberg, NJ 07093, or circle number 103 on the reader service card.

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2 Watts In—30 Watts Out
All Mode Operations with Rx Preamp

B215—2 Meter H/T Amplfier
2 Watts In—150 Watts Out
Designed for H/T use
All Mode Operation with Rx Preamp

B1016—2 Meter Dual Purpose Amplifier
10 Watts In—160 Watts Out
2 Watts In—60 Watts Out
All Mode Operation with Rx Preamp

B3016—2 Meter Amplifier
30 Watts In—160 Watts Out
Operates with 2 to 50 Watts Input
All Mode Operation with Rx Preamp

C22A—1¼ Meter H/T Amplifier
2 Watts In—18 Watts Out
Compact Size (3½" × 2" × 7")
All Mode Operation with Rx Preamp

C106—1¼ Meter Dual Purpose Amplifier
10 Watts In—60 Watts Out
2 Watts In—23 Watts Out
All Mode Operation with Rx Preamp

C211—1¼ Meter Amplifier
2 Watts In—110 Watts Out
High Power H/T Amplifier
All Mode Operation with Rx Preamp

C1012—1¼ Meter Dual Purpose Amplifier
10 Watts In—120 Watts Out
2 Watts In—40 Watts Out
All Mode Operation with Rx Preamp

C3012—1¼ Meter Amplifier
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Optional "N" Type Connectors

D1010—430-450 MHz Dual Purpose Amplifier
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2 Watts In—45 Watts Out
All Mode Operation FM,SSB,CW,ATV
Optional "N" Type Connectors

D3010—430-450 MHz Amplifier
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cam actuated, true zero insertion – tin plated solder tail pins – capable of being plugged into dip sockets, including wire wrap.

Stock No.	No. of Pins	1-9	10-49	50
11055	24	4.98	$4.35	$3.90
11056	28	5.15	4.50	4.05
11057	40	6.81	5.95	5.35
11058	64	12.02	10.50	9.45

IC-KOOLERS™ from UNITRACK® dissipate over 2 watts of heat from IC's, producing longer life and better performance. Just push IC-Kooler on – heat is collected from top and bottom of IC and dissipated. Won't shake loose!

Stock No.	No. Pins in IC	Price
22225	14	$.29
22226	16	.29
22228	18-20	.29

SCREW MACHINED SOCKET PINS, loose, packaged in bags of 100. Stock No. 11310 is solder tail with gold collet tin shell. Stock No. 11311 is wire wrap with gold collet gold shell.

Stock No	Description	1 Bag	5 Bags	10 Bags
11310	Bag of 100 solder tail pins	$ 4.95	$ 4.45	$3.95
11311	Bag of 100 wire wrap pins	11.95	10.75	9.50

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Touch switch capsule. Operating motion is .005" without the use of a levered arm. Extremely fast on and off with low noise. Normally open – rated 115 VAC, 1.6 amp-30 milliohm resistance – .615 radius by .160 thick.

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12098	$1.42	$1.28

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Each keyboard has a p.c. board, elastomeric pad with contacts, ABS bodies and double shot molded keys **Max rating:** 12 VDC @ 20mA **Contact Res:** less than 500 ohms **Bounce:** less than 10 m sec.

Stock No.	Operating Force	Key Travel	Price 1	Price 10
11291	120±40g	2.0±.5mm	$4.95	$4.50
11292	80±40g	1.5±.5mm	3.95	3.60

TI WIRE WRAP SOCKETS
Tin plated phosphor bronze contact – 3 wrap

Stock No.	No Pins	1-99	100 -499	500
11301	8	$.40	$.36	$.30
11302	14	.59	.54	.45
11303	16	.64	.58	.48
11304	18	.73	.66	.55
11305	20	.99	.90	.75
11306	22	1.12	1.02	.85
11307	24	1.25	1.14	.95
11308	28	1.52	1.38	1.15
11309	40	2.05	1.86	1.55

TI LOW PROFILE SOCKETS
Tin plated copper alloy 688 contact pins with gas tight seal.

Stock No.	No Pins	1-24	25-99	100-999
11201	8	$.10	$.09	$.08
11202	14	.14	.13	.12
11203	16	.16	.15	.14
11204	18	.18	.17	.15
11205	20	.20	.18	.16
11206	22	.22	.20	.18
11207	24	.24	.22	.20
11208	28	.28	.26	.25
11209	40	.40	.37	.33

SUB CUB I and **SUB CUB II** are high quality, complete LSI Counter Modules with LCD readout. Modules plug in p.c. board (Stock No. 51071). Complete function evaluation kit (Stock No. 51070) contains: p.c. board, 4.5V battery and variable frequency oscillator to supply train of count pulses. Stock No. 51070 has LATCH, RESET and TEST functions (3 buttons). P.C. board unplugs for breadboard work.

6 Digit LSI Counter Modules with LCD Readouts and Associated Mounting Assemblies

SUB CUB I

SUB CUB II

Stock No.	Description	Price
51070	Complete Function Evaluation Kit (includes batteries but does not include display counter)	$45.00
51071	Mounting P.C. Board only	7.50
51072	SUB-CUB I display counter module only	18.00
51073	SUB-CUB II display counter module only	24.00
51074	Panel Bezel Evaluation Kit for SUB-CUB II (does not include SUB-CUB II counter module)	12.00
51075	DATA SHEET	.25

SINGLE ROW SOCKETS

Both styles breakable to any number of contact positions wanted.

Strip of 25 collet sockets/pins – mount odd-center components easily. Gold plated contacts.

Stock No.	1-24	25	50
10240	$1.70	$1.50	$1.30

Strip of 40 pins with single beam sockets. Tin plated contacts.

Stock No.	1-99	100	500	1000
10850	$1.09	$.90	$.82	$.72

OPCOA

Single Digit Displays – Common Cathode

Stock No.	Color	1	100
12082	Red	$1.12	$ .99
12085	Green	1.84	1.63
12087	Yellow	1.92	1.70
12089	Orange	2.08	1.84

Right Angle Socket for Above Displays

Stock No.	1	100
11010	$1.24	$ .99

OPTEL LCD's with pins

Stock No. 47005

Stock No. 47006

Stock No. 47007

Stock No.	Description	1	10
47005	3½ dig, .5"	$ 5.95	$ 5.50
47006	4 dig, .5"	5.95	5.50
47007	4 dig, .7"	11.90	11.00

The Battery Just Wrap™ Tool
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Stock No.	Description	Price
13340	Battery just-wrap tool with bit and 100 ft. 30 AWG wire	$59.95
13341	Replacement bit	10.35
13342	100 ft. blue replacement wire	7.54
13343	100 ft. white replacement wire	7.54
13344	100 ft. yellow replacement wire	7.54
13345	100 ft. red replacement wire	7.54

MICRO Charts - colorful 8½" x 11" charts eliminate the need to stumble through manuals and summaries. Fully decoded - instant access - totally comprehensive - gives pin outs, cycle times, buy notes, etc., etc.

Stock No	Reference	Price
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23011	8080A/8085A	5.95
23013	6502 (65XX)	5.95
23013	9048 and relatives	5.95
23014	54/7400 TTL Pinouts	5.95
23015	Basic Algorithms	5.95
23016	8086/8088A	5.95
23017	How to generalize from a sample	5.95
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puts IC's on their true row to row spacing. One side is for .300 centers. Flip tool over for devices .600 centers. Put device in tool and squeeze.

ONE TOOL DOES 8 thru 40 PINS!

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NEW! ANTI-STATIC MODEL	10200	$14.95

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03508	S-100 Board, 10 x 5.3	36.95
03509	Z-80 Board, 7.7 x 7.5	39.95
03510	Eurocard Board, 6.3 x 3.9	21.95

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Dip socket-sized plastic panels with numbered holes in pin locations. Slip onto socket before wire wrapping to identify pins. Also write on them for location, IC part number, function, etc. Simplifies initial wire wrapping, troubleshooting and repair.

13295	14 pin
13296	16 pin
13297	18 pin
13298	20 pin
13299	22 pin
13300	24 pin
13301	28 pin
13302	40 pin
13303	96 pin

$1.95 per pack

THERMOPROBE: Identifies Dead Components - Replaces Volt Meters!
Identify dead components which do not emit heat. Just point thermistor probe within 1/16" of board - move over components and see which are dead. Stock No. 22300 Price $21.95

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CIRCLE 54 ON READER SERVICE CARD

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Outlook 1985

The new year marks the ninth year in the present solar cycle, Cycle 21. It is expected to begin with a smoothed sunspot number of approximately 37 and decline to a level of about 25 by December. This is a moderately low level of solar activity, as the present cycle continues towards its minimum value now predicted to occur during mid-1987.

Declining solar activity is expected to result in a further decrease in the number of *10, 15,* and *20* meter DX openings. Except for an occasional opening during the daylight areas to southern or tropical regions, DX openings on *10* meters are likely to be few and far between during 1985. Somewhat fewer DX openings are expected on *15* meters during the new year compared to last year, but openings should be possible to many areas of the world during the late fall, winter, and early spring months. When *15* meter openings do take place, they will most likely occur during relatively short periods of time from a few hours before noon to a few hours after noon. Not much change is expected in *20* meter propagation conditions during 1985. Although there may be fewer DX openings, the band is still forecast to open to almost all areas of the world between the sunrise period and the early afternoon hours. Twenty meters is expected to be the best band for DX during the hours of daylight, and through the early evenings of the summer months.

On the other hand, DX conditions are expected to continue to improve on *40, 80,* and *160* meters. The improvement on *40* meters is expected to be significant, and for the most part propagation conditions on this band should be somewhat better than they were during 1984. Forty meters should remain the best band for DX during the early evening hours of the fall, winter, and spring months, and during the hours of darkness in the summer season. A considerable improvement is expected in DX propagation conditions on *80* meters. This improvement has already been noted during the last months of 1984, and it is expected to continue during the new year. DX openings are expected to be more numerous on this band, and signal levels are forecast to be unusually strong during many openings. Eighty meters will often vie with *40* meters for the optimum DX band during the hours of darkness of the fall, winter, and spring months. A considerable improvement is also expected on *160* meters from mid-fall through the winter months and into early spring.

Shortwave propagation conditions are expected to be considerably poorer during the new year on *10* and *15* meters, more or less unchanged on *20* meters, and improved on *40, 80,* and *160* meters.

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for November 1984

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 6, 15	A	A	B	C
High Normal: 5, 14, 17, 20, 25, 31	A	B	C	C-D
Low Normal: 3-4, 7-8, 12-13, 16, 18-19, 21-23, 26-27, 30	A-B	B-C	C-D	D-E
Below Normal: 1-2, 9, 11, 24, 28-29	B-C	C-D	D-E	E
Disturbed: 10	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**
2. **With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair-to-poor (C-D) on the 1st and 2nd, good-to-fair (B-C) on the 3rd and 4th, good (B) on the 5th, and excellent (A) on the 6th, etc.**

January Conditions

The following is a thumb-nail picture of h.f. band conditions forecast for January 1985. For specific times of DX openings refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts for January and February, as well as charts centered on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for circuits varying in length between distances of 50 and 2300 miles.

10 Meters: Some DX openings should still be possible to southern and tropical regions during the daylight hours, with signals peaking during the afternoon. An occasional opening towards Europe and the east may be possible between 8 and 11 a.m., and towards the Far East during the late afternoon. Some short-skip openings, between approximately 1300 and 2300 miles, are also forecast for the afternoon hours.

15 Meters: Generally good 15 meter DX openings are forecast to many areas of the world during the hours of daylight. Fairly consistent short-skip openings, as a result of regular *F*-layer reflection, are also expected during the daylight hours for distances ranging between approximately 1000 and 2300 miles.

20 Meters: Good DX conditions to most areas of the world are forecast for 20 meters sometime between sunrise and the late afternoon hours. Signals are expected to peak for about an hour or two after sunrise and again during the afternoon. Good short-skip openings over distances ranging between 750 and 2300 miles should be possible. The band occasionally should remain open toward southern and tropical areas into the evening hours.

40 Meters: DX openings should begin during the late afternoon hours, with conditions peaking during the hours of darkness and at sunrise. Atmospheric noise, or static, should remain at low seasonal levels during the month, and signals often may be exceptionally strong. Good short-skip openings are also forecast during the hours of daylight over distances ranging between approximately 150 and 750 miles. As darkness falls, the short-skip range should increase to between 1000 and 2300 miles. Forty meters should be the best DX band during most of the hours of darkness.

80 Meters: With low static levels continuing through the month, fairly good DX openings are expected to many areas of the world during the hours of darkness. During the daylight hours short-skip should be possible up to about 300 miles. During the hours of darkness, the skip should increase, with openings possible between distances of approximately 400 and 2300 miles. It may be a toss-up between *80* and *40* meters for the best DX band openings during the late evening and early morning hours.

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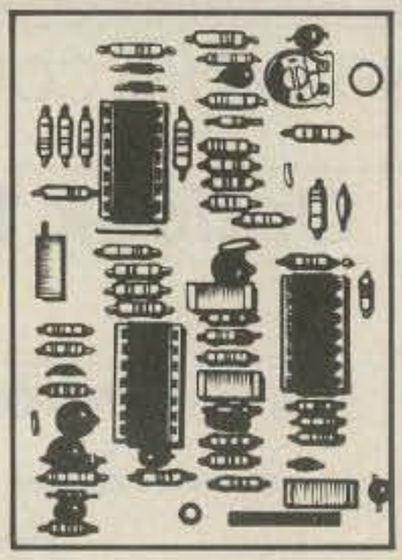

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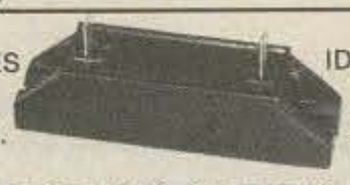

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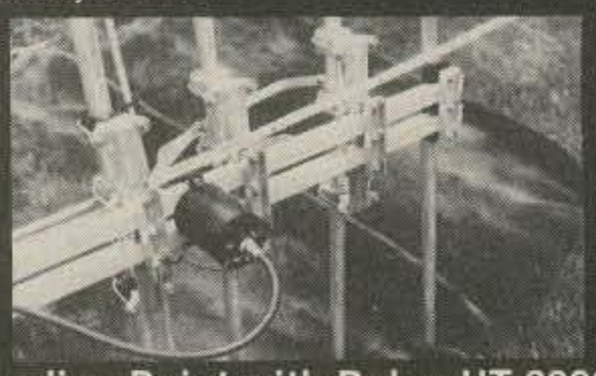

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HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3). Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *standard* time is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are in HST. To convert to standard time in other USA time zones *add* 2 hours in the PST zone; 4 hours in the MST zone; 3 hours in the CST zone, and 5 hours in the EST zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA *subtract* 8 hours in the PST zone; 7 hours in the MST zone; 6 hours in the CST zone and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quater-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data cohtained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

CQ Short-Skip Propagation Chart
January & February, 1985
Local Standard Time At Path Mid-Point
(24-Hour Time System)

Band (Meters)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	Nil	Nil	10-15 (0-1)	08-10 (0-1) 10-15 (1-2) 15-17 (0-1)
15	Nil	10-16 (0-1)	08-09 (0-1) 09-10 (0-2) 10-15 (1-3) 15-16 (1-2) 16-18 (0-1)	07-08 (0-1) 08-09 (1-3) 09-10 (2-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1) 18-19 (0-1)
20	Nil	08-10 (0-1) 10-14 (0-3) 14-16 (0-2) 16-18 (0-1)	06-07 (0-1) 07-08 (0-2) 08-10 (1-4) 10-14 (3-4) 14-16 (2-4) 16-18 (1-2) 18-19 (0-2) 19-21 (0-1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (2-4) 17-18 (2-3) 18-19 (2) 19-21 (1)
40	07-08 (0-1) 08-09 (1-2) 09-10 (2-4) 10-16 (3-4) 16-17 (3) 17-19 (1-2) 18-21 (0-1)	07-08 (1-2) 08-09 (2-3) 09-11 (4) 11-15 (4-3) 15-17 (3-4) 17-19 (2-3) 19-21 (1-2) 21-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-17 (4-2) 17-19 (3-4) 19-22 (2-4) 22-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-17 (2) 17-19 (4-3) 19-22 (4) 22-02 (3-4) 02-04 (2-3) 04-07 (2)

Say You Saw It In CQ

80	07-08 (1-2) 08-09 (3-4) 09-19 (4) 19-21 (3-4) 21-23 (2-1) 23-03 (1-2) 03-07 (1)	07-08 (2) 08-10 (4-2) 10-16 (4-1) 16-18 (4-2) 18-21 (4) 21-23 (3-4) 23-03 (2-3) 03-07 (1-3)	07-08 (2-1) 08-10 (2-0) 10-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-23 (4) 23-05 (3) 05-07 (3-2)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-05 (3-2) 05-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3) 07-09 (2-1)	17-18 (2-1) 18-19 (2) 19-21 (4-3) 21-05 (4) 05-06 (3) 06-07 (3-1) 07-09 (1-0)	17-18 (1-0) 18-19 (2-1) 19-21 (3-1) 21-03 (4-3) 03-05 (4) 05-06 (3-2) 06-07 (1)	18-19 (1-0) 19-21 (2-1) 21-03 (3) 03-05 (4-2) 05-06 (2) 06-07 (1-0)

ALASKA
Openings Given in GMT†

To:	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern USA	*Nil*	18-20 (1) 20-22 (2) 22-23 (1)	16-22 (1) 22-00 (2) 00-02 (1)	04-13 (1) 07-12 (1)*
Central USA	20-23 (1)	19-22 (1) 22-00 (2) 00-01 (1)	17-23 (1) 23-01 (2) 01-03 (1)	03-14 (1) 07-12 (1)*
Western USA	20-00 (1)	19-22 (1) 22-00 (2) 00-02 (1)	18-20 (2) 20-01 (3) 01-02 (2) 02-04 (1)	04-05 (1) 05-12 (2) 12-15 (1) 15-16 (2) 16-17 (1) 05-12 (1)* 12-15 (2)* 15-17 (1)*

†See "How To Use Short-Skip Charts" in box at beginning of this column.
*Indicates predicted 80 meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2) or higher.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

HAWAII
Openings Given in Hawaiian Standard Time†

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	08-13 (1)	06-08 (1) 08-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	06-08 (2) 08-12 (1) 12-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1) 19-21 (1)* 21-01 (2)* 01-03 (1)*
Central USA	07-09 (1) 09-12 (2) 12-14 (1)	06-07 (1) 07-08 (2) 08-13 (3) 13-15 (4) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-05 (1)*
Western USA	09-11 (1) 11-14 (2) 14-16 (1)	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (2) 07-10 (4) 10-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1) 19-20 (1)* 20-22 (2)* 22-04 (3)* 04-05 (2)* 05-07 (1)*

ment is expected in propagation conditions on this band during January. Fair DX openings are forecast to many areas of the world from a few hours after sundown to shortly before sunrise. Short-skip openings up to 2300 miles should also be possible during the hours of darkness. Because of extremely high solar absorption in this frequency range, even during the periods of low sunspot activity, ionospheric propagation generally is not possible on *160* meters during the daylight hours.

Remember the following rule for *40, 80,* and *160* meter DX openings. Conditions on these bands maximize as the sun rises on the *eastern* terminal of a path. For example, for openings between North America and Europe, conditions should be optimum as the sun rises in Europe. For openings between the South Pacific and North America, look for the strongest signals as the sun rises over North America.

V.H.F. Ionospheric Openings

January is generally a poor month for v.h.f. ionospheric propagation Conditions are poorest for sporadic-*E* and trans-equatorial (TE) openings, and auroral activity is generally at a low seasonal level.

There is a possibility for meteor-scatter-type openings during the first week of the month resulting from the *Quadrantids* meteor shower. This is a major shower which should peak on the third and fourth with about 30 to 40 meteors entering the earth's atmosphere each hour.

Best bet for sporadic-*E* and auroral-type openings is on those days when h.f. conditions are expected to be Disturbed or Below Normal. These appear in the Last Minute Forecast at the beginning of this column.

Solar Cycle Progress

The sunspot cycle did a nose-dive during September. According to the official observations made by the Royal Observatory of Belgium, the monthly mean sunspot number was 15.4, the lowest recorded since April 1977.

The highest daily observation was 61 on September 3. There were nine days during the month when the sunspot count was zero.

September's mean level results in a smoothed sunspot number of 53 centered on March 1984. The solar cycle is measured by the level of smoothed sunspot number. A smoothed sunspot number of 37 is forecast for January 1985.

73, George, W3ASK

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Novice Roundup

The American Radio Relay League (ARRL) sponsors the Novice Roundup (NR) Contest each February. The Novice class of license came into existence in 1951, and the first Novice Roundup was held in 1952. This year's contest is the 34th Novice Roundup.

The name "Novice Roundup" was established many years before Technician class licensees were granted code operating privileges in the so-called Novice bands. The name is still appropriate because operation remains confined to the frequency segments (subbands) available to Novice class licensees on a shared basis with all other classes of American amateur radio licensees.

Participants

This contest is primarily for American Novice and Technician class licensees, but General, Advanced, Extra, and foreign (DX) operators are also invited to operate in it. Novices and Technicians can work all amateurs (Novice, Technician, General, Advanced, Extra, and DX), but General, Advanced, Extra, and DX amateurs are only allowed to work Novices and Technicians in the contest. This is a good rule, because it guarantees that at least one Novice or Technician is involved in each NR contact.

Benefits

I advise you to operate in the NR even if you have a poor station and/or low code proficiency. It will be nice if you get a certificate (see picture of ARRL Novice Roundup Certificate of Merit) for working at least 200 NR contacts, and you will have just cause to be extremely proud if you are the top scorer in your ARRL section, or one of the top ten scorers in the country. However, you do not need to achieve these lofty accomplishments to benefit from NR activity. This contest provides a great opportunity to contact amateurs in many counties, states, and countries. You probably can work more contacts during one day of the NR contest than you normally work in a month. These contacts can help you qualify for hundreds of operating awards. Novice contacts remain valid after one upgrades, even if the callsign is changed.

NR operation will let you judge your operating skills and station performance against those of other operators. NR participation can also help you increase code receiving and sending proficiency. You can benefit in many ways by operating in contests every week, and they are listed in the Contest Calendar of this magazine each month.

2814 Empire Ave., Burbank, CA 91504

Bob Curole, KA5LGI, of Golden Meadow, Louisiana, has been licensed as a Novice since April 1981, and he is the first Louisiana Novice to submit a photograph to me for inclusion in the Novice column. Bob has contacted amateurs in all states plus 33 countries. He operates on the 15 and 40 meter Novice bands. He likes to ragchew (chat) and work DX (foreign amateurs). His station includes a Kenwood TS-830 transceiver, Kenwood AT-230 antenna tuner, and an inverted Vee antenna that is supported at the center by a 40 foot tower. As the picture shows, he also has shortwave listening and monitoring gear in his shack.

Competition and Awards

This contest provides a unique opportunity for Novices and Technicians to compete on the air against other Novices and Technicians in their own ARRL sections, plus against those who operate from other ARRL sections. Novices just compete against Novices, and Technicians only compete against Technicians; Novices and Technicians do not compete against each other in this contest.

The ARRL issues a nice certificate to each Novice and Technician who makes at least 200 NR contacts, and an ARRL certificate is awarded to the top-scoring Novice and Technician in each ARRL section. The ARRL also issues appropriate certificates to the top scorers (Novices/Technicians) in the country.

General, Advanced, Extra, and foreign (DX) amateurs are invited to take part in the NR contest, but they are not eligible for NR certificates. These operators provide contacts, cards, and code practice for Novices and Technicians.

Multi-operator stations (two or more operators using the same callsign at one location, including loggers) are also ineligible to win NR contest awards. This rule keeps it a one-on-one contest and prevents a group (such as a club) from competing directly against an individual Novice or Technician operator.

No certificates are awarded to DX Novices who operate in the NR. However, American Novices greatly appreciate opportunities to contact DX amateurs, and I hope many DX amateurs will be on the Novice bands during this contest. Very few (150) Novices and Technicians will earn a contest certificate, but the others are likely to be happy with a few DX contacts.

Dates and Times

The NR contest starts at 0001 UTC on the 26th of January, and it ends at 2359 UTC on the 3rd of February. To state it more simply, it starts Friday evening January 25th (local time), and it ends Sunday evening February 3rd. The NR starts one minute past 4, 5, 6, and 7 p.m. PST, MST, CST, and EST, respectively. Similarly, the NR ends one minute before 4, 5, 6, and 7 Pacific, Mountain, Central, and Eastern Standard Times, respectively.

The NR contest length is 215 hours and 58 minutes. Novices and Technicians are allowed to work a maximum of 30 hours in the NR. The NR log must show each time one goes on and off the air during the contest, and the minimum time off the air is 15 minutes. Listening time on the air counts as contest operating time, and it must be shown as time on the air. I advise you to be completely honest in all contest matters; it helps you to gauge your improvement in subsequent contests.

Operating

Bands. All NR contacts must be made in the 80, 40, 15, and 10 meter Novice bands. No crossband contacts are allowed, such as listening on 10 meters and calling or answering on the 15 meter Novice band. It does not help to work the same station more than one time on a band, or on more than one band, since credit is just allowed for one contact with each different station worked. Keep up-to-the-minute dupe sheets (the dupe sheets are two-sided) of all stations con-

tacted during the NR to help you avoid working the same station more than one time. It is fairly common to have DX amateurs call American Novices using voice (usually s.s.b.) on the 10 and 15 meter Novice bands; these crossmode (voice-code) contacts do count in the NR, as long as both sides of the contact are within the same Novice band.

Identification. Novices add /N and Technicians add /T to their callsigns during this contest to indicate their eligibility to all amateurs participating in the NR. As examples, a Novice with a callsign such as KB6ABC uses KB6ABC/N, and a Technician with a callsign such as WA6FNM uses WA6FNM/T during the contest. Out-of-area operation is also indicated in callsigns to minimize confusion. As an example, if a Technician with an apparent California callsign, such as WA6FNM, is operating in the NR from Louisiana, he would identify as WA6FNM/5T to indicate that he is operating from the ARRL Louisiana (LA) section instead of the Los Angeles section (LAX).

General, Advanced, and Extra class licensees are not required to indicate class of license as part of the callsign used in the NR. However, many of us use /G, /A, or /E to make it very clear to other General, Advanced, Extra, and DX amateurs that we are not valid NR contacts for them; we are only valid NR contacts for Novices and Technicians. This additional identification is particularly useful in cases in which callsigns such as KA6CUT and WB6PNY are used. Such callsigns might lead one to believe that these amateurs are Novice or Technician licensees, whereas they are both Extra class amateurs.

Objective. The idea is to work as many amateurs as possible in all the countries and ARRL sections you can contact. It is very helpful to maintain a check sheet to let you see at a glance which countries and ARRL sections you still need to multiply your NR score as you operate in the contest. It is simple to start with a list that shows all ARRL sections grouped by callsign areas and to cross out each section as it is worked, to show that it is no longer needed as a contest multiplier. The accompanying list of ARRL sections can be reproduced to serve as an aid.

Each time a new section or country is worked, it must be indicated (in sequence) in the NR log. Simply start with number one and continue up as you earn multipliers, including countries other than Canada and the United States.

More than one section abbreviation is shown in the ARRL sections list, if more than one is known to be commonly used. Usually very few foreign amateurs are contacted during this contest, and it is common practice to simply add the callsign of the first amateur contacted in each country to the check-off list to show that country is no longer needed for NR multiplier credit.

Typical Contact. As is true in all contests, NR contacts should be as brief as possible. A typical good NR contact between KB6ABC and W6JEP in the first few days of this contest could be as follows:

CQ NR CQ NR CQ NR CQ NR CQ NR DE KB6ABC/N

CQ NR CQ NR CQ NR CQ NR DE KB6ABC/N KB6ABC/N

CQ NR CQ NR CQ NR DE KB6ABC/N KB6ABC/N KB6ABC/N K

KB6ABC KB6ABC DE W6JEP W6JEP NR K

W6JEP DE KB6ABC BT 579 LA 579 LA BK

BK R 589 LA 589 LA DE W6JEP BK

BK R 73 CQ NR CQ NR CQ NR DE KB6ABC/N KB6ABC/N NR K

Look at the preceding typical exchange and evaluate it very carefully with regard to the comments in the rest of this paragraph. In the initial call, KB6ABC included the /N each time with his callsign to indicate contest eligibility to all other amateurs. Notice also that the number of CQ NR transmissions decreased from five to three and station identification increased from one to three during the calling sequence, and the NR contest activity was again indicated prior to the invitation to transmit (K) at the end of the third CQ NR sequence. When W6JEP answered the call, she just identified both stations twice, left off the /N, and indicated contest participation by sending NR before the invitation to transmit. Once the two-way contact has been established, there is no need to continue using /N or/T.

The KB6ABC reply to W6JEP is very brief; the callsigns are just sent one time each and only at the beginning of the reply. The RST report and ARRL section are sent twice to minimize possible requests for repeats. Neither the term *RST* nor the word *section* precedes the report and League section, since it is obvious what both are, and the break sign (BK) is used to eliminate unnecessary identifications. During contest activity, a series of short

ARRL 74 Sections Check-Off List

(1)	CT	CONN	Connecticut
	EMA	E MASS	Eastern Massachusetts
	ME		Maine
	NH		New Hampshire
	RI		Rhode Island
	VT		Vermont
	WMA	W MASS	Western Massachusetts
(2)	ENY		Eastern New York
	NLI		New York City and Long Island
	NNJ		Northern New Jersey
	SNJ		Southern New Jersey
	WNY		Western New York
(3)	DEL	DE	Delaware
	E PA	E PENN	Eastern Pennsylvania
	MDC	MD or DC	Maryland or District of Columbia
	W PA	W PENN	Western Pennsylvania
(4)	AL	ALA	Alabama
	GA		Georgia
	KY		Kentucky
	NC	N CAR	North Carolina
	N FL	N FLA	Northern Florida
	SC	S CAR	South Carolina
	S FL	S FLA	Southern Florida
	TN	TENN	Tennessee
	VA		Virginia
	WIN		West Indies (KG4, KP4, KV4, etc.)
(5)	AR	ARK	Arkansas
	LA		Louisiana
	MS	MISS	Mississippi
	NM		New Mexico
	N TX	N TEX	Northern Texas
	OK	OKLA	Oklahoma
	S TX	S TEX	Southern Texas
(6)	EB	E BAY	East Bay
	LAX	LA	Los Angeles
	ORG		Orange
	PAC		Pacific (KH6, etc.)
	SB	S BAR	Santa Barbara
	SCV		Santa Clara Valley
	SDG		San Diego
	SF		San Francisco
	SJV		San Joaquin Valley
	SV		Sacramento Valley
(7)	AK	ALAS	Alaska
	AZ	ARIZ	Arizona
	ID	IDA	Idaho
	MT	MONT	Montana
	NV	NEV	Nevada
	OR	ORE	Oregon
	UT		Utah
	WA	WASH	Washington
	WY	WYO	Wyoming
(8)	MI	MICH	Michigan
	OH		Ohio
	WV	W VA	West Virginia
(9)	IL	ILL	Illinois
	IN	IND	Indiana
	WI	WIS	Wisconsin
(Ø)	CO	COLO	Colorado
	IA		Iowa
	KS	KANS	Kansas
	MN	MINN	Minnesota
	MO		Missouri
	NE	NEBR	Nebraska
	ND	N DAK	North Dakota
	SD	S DAK	South Dakota

Canadian Provinces

MAR	VE1/V0	Maritimes or Newfoundland
PQ	VE2	Quebec
ON	VE3	Ontario
MB	VE4	Manitoba
SK	VE5	Saskatchewan
AB	VE6	Alberta
BC	VE7	British Columbia
NWT/ YU	VE8	Northwest Territories or Yukon

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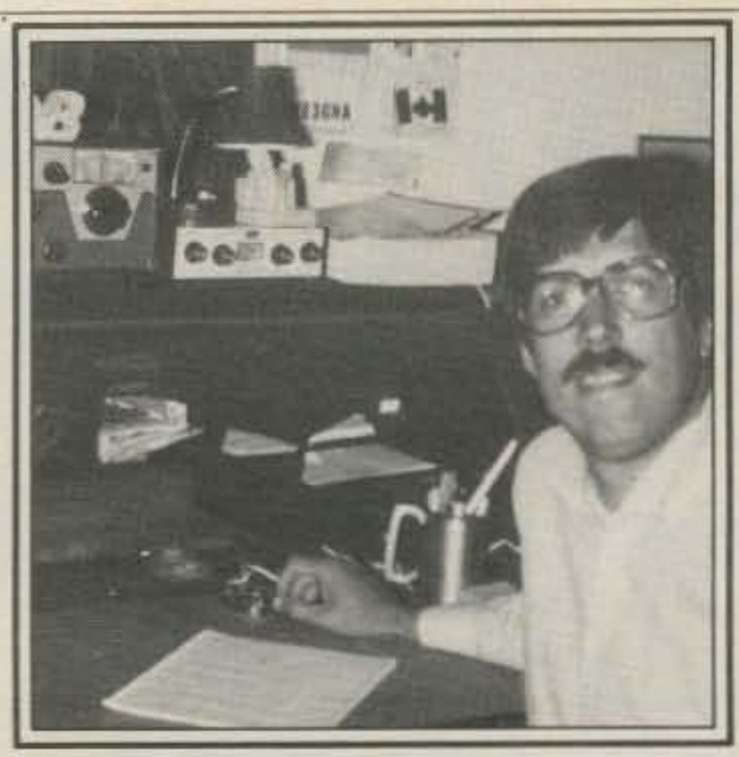
transmissions is not likely to extend past 10 minutes, and the identification shown in the sample exchange suffices. Note that the W6JEP response is short; the *R* advises that the KB6ABC contest data has been received. W6JEP then sends the report (RST) and her section twice, identifies with just her callsign to give KB6ABC assurance that he is copying the correct signal, and sends the break sign to invite KB6ABC to respond.

When KB6ABC answers, he sends *R* to indicate the contest data has been received, he may send best regards (73), and he then sends a short contest call in case another station is waiting for a contest contact. When the short call is sent, the /N is again added to indicate contest eligibility to all amateurs. This indicated brief exchange is further abbreviated after the first few days the contest has been in progress, but the sample exchange is suitable at the start of each year's NR.

After the first few days of NR activity, shorten the call to a single 3 by 3 or 2 by 2 (CQ NR CQ NR DE KB6ABC/N KB6ABC/N NR K, as an example) and listen carefully (above and below your transmitting frequency) for answers before repeating this call. The rest of the previous explanation holds true when using this preferred shorter calling procedure.

Brevity. Do not routinely exchange normal contact information during contest contacts. In other words, do not send your name, location (QTH), rig, antenna, weather (WX), or mailing address information as parts of contest contacts. Keep each contact brief. Do not send faster that you can receive accurately; let the other fellow slow down to a speed you can copy. If the other operator sends too fast, tell her/him to send more slowly (QRS).



Bob Glazer, KA3KKP, of Harrisburg, Pennsylvania, has been licensed since January 1983. He is a project engineer with a consulting firm, and he is on the road about 70 percent of the time. Despite this handicap, Bob averages about 15 contacts per month. He has contacted amateurs in 28 states and 4 countries so far. His shack includes a Drake TR-3 transceiver, matching RV-3 remote frequency control, and a dipole antenna that is fed through an MFJ-941B antenna tuner. Bob hopes to build a QRP (low power) transceiver to operate from motel rooms while he is on the road.

If you contact a county, state, or country you need to have confirmed, simply request a QSL when you send your card. I send a card to each amateur contacted for the first time, which is not a common practice among most amateurs. However, most amateurs send a QSL in response to each card received. If all amateurs just responded to cards received, none would be exchanged. Nevertheless, if received cards initiate completion of the QSL exchange, that is okay; the person who wants the other amateur's card is simply the one who begins the exchange.

Logging

Required Entries. Your NR log must show the time each contest contact started. It is preferable to use Universal Time Coordinated (UTC) when logging radio contacts, since it eliminates possible time zone confusion. Most experienced amateurs use only UTC. UTC is still called Greenwich Mean Time (GMT), Greenwich Civil Time (GCT), Zebra time, or Zulu (Z) time by many amateurs, and they are all meant to indicate the same time. However, UTC has been the correct term since 1 January 1974 and it should be used. The other amateur's callsign (/N and /T indicators not required) and ARRL section (or country) must be logged for each contact. Received and sent signal (RST) reports must both appear in the NR log. Your station callsign, frequency, and dates of contest operation are also required.

Forms. Special NR contest log sheets can be requested from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111.

The NR logs do not have to be mailed to the ARRL until one month after the contest ends, so you have time to request logs from the ARRL, fill them in, and mail them. If you transcribe NR contest entries from your original log, be sure to repeat all contact information on the forms to be turned in. ARRL entry forms and summary sheets should also be requested to accompany your contest logs. Send a self-addressed and stamped envelope (s.a.s.e.) with your request for these forms. The ARRL also has contest check sheets. You should request the ARRL forms immediately so that you will receive them in time for this contest.

Submitted Material. The contest material submitted to the ARRL is not returned, so do not sent your only (original) log sheets. It is a simple matter for most of us to duplicate material before mailing it to the ARRL. Take your time and try to submit correct material that is easy to read. Checking contest entries is a tough job, but you can make it easier for League checkers by turning in good material. The League appreciates receiving check logs from General, Advanced, Extra, and DX operators who take part in the NR.

Scoring

Contact Points. One point is earned for each station contacted while on the air in the NR, whether or not contacted ama-

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teurs are participating in the contest, as long as the report and ARRL section are obtained.

Code Proficiency Points. If you have an ARRL code proficiency certificate, your stated receiving speed (words per minute) is added to your point total for the stations you contacted. If you do not hold an ARRL code proficiency certificate, or if you want to increase the rate shown on your certificate, you can submit your January or February W1AW or W6OWP qualifying copy with your NR material to claim these extra points.

Multipliers. The total number of points derived from your contest contacts and your ARRL (not FCC) certified code proficiency rate are multiplied by the number of foreign countries and ARRL sections you contacted during your NR contest operation. Remember that Alaska, Canadian Provinces, Hawaii, and the West Indies (Guantanamo Bay, Puerto Rico, and Virgin Islands) are ARRL sections and do not count as countries in this contest.

Summary

I hope to contact you on one of the Novice bands. I work about 1,000 Novice band contacts every year, and I have participated in each Novice Roundup. When the NR contests were held in the 1952 through mid-1970 era, the Novice license was just valid one year; it could not be renewed, and it was not available to anyone who had previously held any class of amateur radio operator license. In that time frame, no Novice could compete in more than one NR as a Novice, and newer Novices seldom participated at all. Novice licenses are now valid a maximum of ten years and they can be renewed, which means that Novices can be experienced in previous NR contests, and improved scores should result. Similarly, it is a relatively recent change that allows Technicians to use the Novice code bands. Enjoy this contest by putting your station in top condition and reserving adequate good operating time during the NR.

NR contest activity has always been slow at the start, and it is common to have other operators request an explanation of contest rules. I advise you to direct them to the NR coverage in this column or in other magazines, which is simpler and better than trying to give all this information to each amateur who requests it. NR activity continues to build as the days pass and more amateurs become aware of it. By the last day of the contest, activity is excellent. If you get this issue before the contest starts, please mention the Novice Roundup to every amateur you contact to let them prepare for this excellent contest.

As usual, the cooperation of the ARRL has been excellent during the preparation of this contest announcement. I particularly appreciate the help provided by Mike Kazinsky, the NR Contest Manager.

73, Bill, W6DDB

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CIRCLE 39 ON READER SERVICE CARD

DX

a monthly feature by
HUGH CASSIDY, WA6AUD

NEWS OF COMMUNICATIONS AROUND THE WORLD

Don't you ever try to get there;
It's to dream of, not to find.
The Honor Roll's glory will always be
Mostly in your mind . . .

One would think that with the winter solstice at hand, the current sunspot cycle groping for its bottom line, and the New Years and Super Bowl football games to worry about, most DXers would be thinking of DX past and what the coming year will bring for the Deserving. But just when we were settling into the shack for the local rainy season, we learned again that there always will be more questions, and one of the Locals was up the hill to ask another. We should hardly have expected anything else.

"Over the years," this one said, starting right in to work what was on his mind, "you have said that DX and DXing will always continue to bring something different or new. Back a bit I would have thought that all you were talking about were new countries. But now I sometimes suspect that in DXing what might appear to be simple and straight-forward when one first starts, might turn out to be something a bit more complex." The Local leaned close to nail our attention. "You do understand all of this?" he asked, and we were quick to nod our heads as we always do when we hear a rhetorical question and wonder what the answer might be. We were sure that we would hear most everything that was on the Local's mind, as this one had surely come to talk.

"Remember when we drove east last fall, me and the XYL," he began, and we easily did recall those tranquil weeks. "Well, on the way home," he continued, "we came west on Interstate 70, right across the Rockies. One afternoon when coasting down the west slope of those mountains and just west of Grand Junction in Colorado, I spotted a tribander just south of the freeway. Not being in any great hurry, we peeled off the freeway and found the QTH of the amateur. I figured it would be a DXer and it was. But guess what!"

We silently ran through a number of good possibilities and were quick to admit that we were stumped. The Local one smiled.

"You probably won't believe this," the Local said with the air of one revealing a matter of great import, "but this DXer told me that he was a 'retired DXer.' He was quite definite about it. He told me that he had worked just about everything. He even showed me QSLs from places I'd never even heard of—places like Goa and Togoland and the Saar and Kuria Maria. He showed me a card from a place called Maria Theresa, but only laughed when I tried to find out where it was. All he could say was that it was a deep secret. Heck! I couldn't even find it in the deleted country lists. But he had it, and he said he was a retired DXer. I didn't understand what he meant then, and after thinking it over, I don't understand now. Do you?"

77 Coleman Dr., San Rafael, CA 94901

This is the group of JAs from the DX Family Foundation which put BV0YL and BV0JA on the air last June and made for some an easier DXCC counter to corner. In the front row are JH1KRC, China Radio Assn. member Liu, JA1HEH, and JA1XGQ. In the back row are JA7FWR, JA1YDJ, BV2A/BV2B, JP1LAB, and China Radio Assn. member Lu. Tim Chen, BV2A, is center in the back row. That has been about all the BV action for many years, but efforts of the DX Family Foundation and others have brought at long last a BV contact to the Deserving.

We thought that we did. Perhaps there will always be those who come glowingly onto the DX scene and believe there can never be enough of DXing. And many will believe that a true-blue DXer will never lose interest in DXing and this is a correct belief. But there are fine shadings in all DX activities, and you learn when you attain the 300 DXCC sticker that you are passing from the DX land of plenty to the land of eternal DX famine. But we still had the Local before us with unanswered questions, and before we could say anything he was talking again.

"This fellow, this retired DXer," the Local continued, "is on the Honor Roll! Think of that! And not only on the Honor Roll, but he has 5 band DXCC and WAZ. When I asked him about the 5B WAZ, he just said that he was working on it, and that probably he would make it in a couple more of the sunspot cycles, whatever that means. Being a 'retired DXer,' he had to take things a bit easy to make them last." The Local was just standing there shaking his head. "I don't understand it at all," he said. "Here was this fellow with a nice QTH, lots of antennas, including a 40 meter beam, a good location with low noise level, and a shack filled with gear, and all he would say was that he was a 'retired DXer.' I don't get it."

Long ago we realized that most DXers revere age. The years that you put in DXing are the true measure of your worth, possibly almost as much as your DXCC total. Old DXers are supposed to have all the answers, and always looking for the easy way out, we proceeded to haul this Local up the hill to the Old Timer. This usually works, and all we had to do was sit and listen to the Local run again through his recital. The Old Timer hardly seemed to be shaken at all.

"A couple of weeks back I ran across an old DXer friend of mine," the Old Timer recalled, "a rather well-known DXer I've known for many years. This one is on the Honor Roll, has a whole bunch of awards, belongs to the FCC, is active in the DX club, makes all the conventions, and is frequently heard on the 2 meter box." The Local started to frown at the words, but the Old Timer held up a hand to forestall anything. "Just listen!" he advised.

"So I asked this old friend what he was doing or had done since I last saw him. My friend acknowledged that he was doing very little DXing, sometimes not turning on the big rig for a couple of months at a time. But he assured me he was still active, only waiting for something new or important to show and he was sure that something would. Meanwhile, he was completing plans to build a new home down country and was putting out for subcontractors." The Old Timer fixed his gaze on the Local. "How old would you estimate this DXer friend of mine to be?"

We could just about see the thoughts struggling for form as the Local thought out this one. Finally he spoke: "With his being on the Honor Roll, apparently with enough money to build a new house, I'd say he's probably in his late forties, possibly the early fifties at the outside. But hardly older than that." The Local paused, waiting for a reply that was slow in coming. He finally had to ask, "Well, how old is your friend?"

We thought that the Old Timer was looking a bit anticipatory. "My friend is in his mid-seventies," he said. Even we had to stop and think about this. Finally the Local found his voice again.

Say You Saw It In CQ

The WPX Program

Mixed

1128	N4NX	1131	KC2RS
1129	EA9KF	1132	WI4K
1130	EA3CTI		

S.S.B.

1685	N4NX	1687	EA9KF
1686	CX4HS	1688	KØHQW

C.W.

2291	N4NX	2294	EA3CLV
2292	PY1DEA	2295	KY9P
2293	DL2GBB		

WPNX

223	WN6OYV

Endorsements

Mixed: 450 N4NX, EA9KF, EA3CTI, KC2RS, WI4K. 500 N4NX, WI4K, EA9KF, EA3CTI, KC2RS. 550 N4NX, EA9KF, EA3CTI, KC2RS, WI4K. 600 N4NX, EA9KF, EA3CTI, KC2RS, WI4K. 650 N4NX, KF8K, EA9KF, EA3CTI, KC2RS. 700 N4NX, K8HF, KF8K, NE6I, EA9KF, EA3CTI, KC2RS. 750 N2AIF, N4NX, KF8K, EA9KF, EA3CTI. 800 N2AIF, N4NX, KF8K, EA3CTI. 850 N2AIF, N4NX. 900 N2AIF, N4NX. 950 N4NX. 1000 N4NX, EA9IE, K9UQN. 1050 N4NX, EA9IE. 1100 N4NX, EA9IE. 1150 N4NX, EA9IE. 1200 N4NX. 1250 N4NX, KL7AF. 1450 EA2IA. 1500 N7TT.

S.S.B.: 350 N4NX, CX4HS, EA9KF, KØHQW. 400 N2AIF, N4NX, CX4HS, EA9KF, KØHQW, KT1H. 450 N2AIF, N4NX, VE4AT, K8HF, CX4HS, EA9KF, KØHQW. 500 N2AIF, N4NX, VE4AT, EA9KF, KØHQW. 550 N2AIF, N4NX, EA9KF. 600 N4NX, W7KWI, EA9KF. 650 N4NX, EA9KF. 700 W6BCQ, N4NX, EA9KF. 750 N4NX, EA9KF. 800 N4NX. 850 N4NX. 900 N4NX. 950 N4NX. 1000 N4NX, EA9IE. 1050 EA9IE. 1100 EA9IE. 1150 EA9IE. 1300 N7TT. 1950 ZL3NS.

C.W.: 350 N4NX, DL2GBB, G4GCK, EA3CLV. 400 N4NX, DL2GBB, G4GCK, EA3CLV. 450 N4NX, EA3CLV. 500 N4NX. 550 N4NX, W9PWM, JA3ARM. 600 N4NX. 650 N2AIF, N4NX. 700 N2AIF, N4NX, SM5DAC. 750 N2AIF, N4NX. 800 W1WAI. 1050 N7TT. 1100 EA2IA. 1150 EA2IA. 1300 W3TVB. 1800 WA2HZR. 1850 WA2HZR. 2250 W2NC.

10 meters:	N4NX, CX4HS, EA9KF.
15 meters:	N4NX, EA9KF.
20 meters:	N4NX, G4GCK, EA9KF, WI4K.
40 meters:	N4NX, WB8ZRL, EA9KF.
80 meters:	N4NX, EA9KF.
160 meters:	N4NX, EA9KF.
Asia:	N4NX, EA9KF.
Africa:	N4NX, EA9IE, EA9KF.
No. America:	EA9KF, W9PWM, KT1H, N4NX, KA9GZM, G4GCK.
So. America:	N4NX.
Europe:	N4NX, CX4HS, EA9KF.
Oceania:	N4NX, G4GCK.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

"In his mid-seventies and building a new house!" There was something, either surprise or disbelief, in his voice. "And he is still sticking close to DX? Doesn't anyone ever tell him he might be stretching things just a bit at his age?" We would have to admit that we had been thinking along similar lines, though possibly from our perspective we could be a bit more understanding.

"Most DXers eventually are willing to admit," the Old Timer continued, "that when they found DX they found something not generally matched elsewhere. Just DX itself, the working of stations halfway around the world, the friends one makes in foreign lands, the camaraderie and mystique, the endless competition, the status that one attains as one advances in DXCC counters, and the acceptance by those who are among the best cannot be matched. There is a joy and pride that only a DXer can know. It is a world by itself, and once one has entered it, one usually never wants to leave it. Even if one grows older and tires maybe just a bit, in DXing one always lives with some anticipation. My friend does not think he is building a new home late in life. He is enjoying what is here now, and that includes DXing. One may retire from the front ranks, but be sure that no DXer ever intends to be caught in the rear ranks—not while there is still DX on the bands and hope that more and new DX will show some day."

The Local still had some questions, though we thought that at this point it might be better to think than to talk. "If as you intimate," he pressed on, "so many of the high totals are retired, more or less, just who are the really full-bore DXers these days? Is anyone tired or retired?" The Old Timer laughed again.

"I have long maintained," he said, "that the DXCC certificate in itself is only the entering ticket. The real spur comes when one is around the 200 country mark. There some will say you have

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5812	YU2VB	5817	JA7SGV
5813	DK6NC	5818	JJ3AFV
5814	DL8QT	5819	YU7BCF
5815	JP1BJR	5820	W8QID

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

worked the easy ones, possibly a few tough ones, but you are in the area where those still needed are among the rare or semi-rare. There is where you rush into the fray at every opportunity; there the need for a new country at times can be felt almost physically. Each new country is a treasure; each one missed is a disaster. And always there is a great and unfulfilled need and a large number yet to work. Some have considered it a dreary prospect; some in looking back think that it was a time for joy and strife and remembrances. Maybe you have already noted this." The Local had to admit that he did not think he had.

The Local was starting to look a bit numb, especially around the eyes, and we knew that it was time to head down the hill. "Did you get all the answers you need?" we asked along the way, and the Local shook his head.

"I came asking about that retired DXer," he said, "and I am told that yes they do retire, but really they do not. I

This is the very neat station belonging to Carol, SV5QX and Stratis, SV5OX located on the Island of Rhodes in the Dodecanese. They are pleased to QSO with all who may need a c.w. or s.s.b. contact on all h.f. bands, including 160 meters. QSL P.O. Box 157, Rhodes, Greece GR85100. (Photo via Jack, W2LZX)

wonder about DX and who is the maddest in the chase, and I am told that it is those DXers around the 200 country list, which is just about where I am now. Lucky me! And I'm even advised that when you reach the 300 country level, you are in real trouble. Everything I ask about has an answer, and usually an answer I don't understand at all!"

What do you say when you have to comfort one with such troubles? We put a firm hand on his shoulder and with deep assurance said, "You will, you will!" All true-blue DXers eventually do. What may be complex now will be simple then. What is puzzling will be understood; what will be needed will be found. Now all you have to do is hope that it will come when you can still use it. It probably will. Good things will always come to the Deserving.

Antarctica

Grupo Argentino de CW notes that a couple of stations in the Antarctic are on rather regularly. LU4ES on Marambio Island is often found at 14342 kHz from 1900Z. In the South Shetlands, 4K1GDG is often on 80 meters on Sunday from 2200Z.

Subbands

Recently there was a note from a 160 operator in one-land calling attention to the lack of c.w. areas on that band and the problem for DXers, the writer noting that most DX on 160 is worked on c.w. Then there was the phone expansion on 80, 40, 20, 15, and 10 meters and authority extended for the Pacific and Alaska to use phone below 7100 kHz. Some or all of the discussion on expansion of the phone bands extends back 10 years or more.

In the June *QST* the Canadian News Fronts, touching on the matter, noted that every time there is a U.S. phone expansion, the VEs feel they have to expand their own phone subbands to side-step the U.S. expansion. They noted that this was the feeling in 1953 when the U.S. expanded from 3850 to 3800 kHz, in 1960 when there was a move from 14,300 to 14,350 kHz, in 1972 when the U.S. went from 3800 to 3775 kHz, and the recent move from 14,200 to 14,150 kHz. It might be noted that in the above article a proposal was made to eliminate subbands entirely for the VE amateurs.

Some of the VEs were aghast at the idea even being mentioned. A year or so back over 3000 VEs responded to a survey to end subbands, and then there were 14% in favor, 67% against, and 19% unable to decide. There has been some speculation that with the expansion on 80, 20, 15, and 10 meters for the W/Ks since the survey, the thought might be different now. There are also some who question whether c.w. and phone can live in fraternal bliss without the division of subbands.

Probably we have mentioned it previously, but subbands came for some but not all countries as a result of international radio conferences held in Region II of the ITU during the twenties and thirties. The U.S. delegation took the lead in attempting to bring order to the bands and advocated subbands for c.w. and phone. The proposal was adopted by the group. The U.S. and Canada implemented the agreement but the next time there was a Region II international meeting on radio and the spectrum, it was noted that this subband idea was considered a good idea—good for the U.S. and Canada, but the other countries had special needs. Thus, some 40 to 50 years later you as a working DXer are well aware of how things have gone in this effort.

In July the FCC dismissed a petition aimed at reopening the "No Code " proposal. One should not expect that this will be the final word. However, if the phone expansions continue in the future, where can c.w. thrive? If c.w. starts to fade, how long will it be before someone is monitoring the bands, counting the c.w. operators, and asking again why c.w. is required for an amateur license when only a handful of c.w. dinosaurs use the frequencies. Possibly the "no-code license" proposals, which never are really dead, will be exhumed for another run. After all, the point could be raised about the increased band occupancy that ensued when any code proficiency was dropped from the license requirements for the 11 meter band. Things got so good they even dropped the license requirement.

Years back when filling out a term as an officer in a DX club, it was proposed that the club take over the call-area QSL bureau. We tried to raise a word of caution, but we were trampled in the rush. There were some who very clearly believed that if the club ran the QSL bureau, they would get more QSL cards. It was not that they were short or had any number outstanding; they just believed that they would get more. The feeling is that some think that if there is expansion of the phone subbands, there will be more DX available and they will work more DX.

Probably there are no real solutions and probably times change, and whether we like it or not, we have to change with them. Some have noted that the difference that marks an amateur is the code requirement.

It may be correct to believe that more is better. But then again, you probably will have a few years to think about it.

But Is Bigger Better?

Apparently IARU Region II has some ideas on the subject, the subject being the size of QSL cards. At a meeting last year in Cali in Peru they adopted a proposal that member societies limit outgoing QSL cards through their bureaus to those meeting the standards adopted by the group. The ruling applies not only to oversize QSLs, but to undersize ones as well. It goes into effect January 1, 1985.

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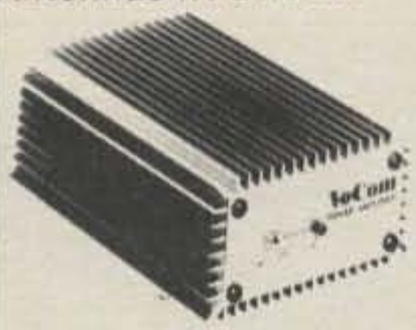

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The optimum size for a QSL card under the decision adopted by IARU Region II is 3½" × 5½". The limits are set at from 7 cm to 11 cm high (2¾" to 4½") to 12 cm to 16 cm wide (4¾" to 6⅜"). The message coming through is that the thinking is not smaller and not larger, but uniform is better. This size limit in Region II or the IARU will very likely show throughout the other IARU zones.

Some DX Notes

There are more short notes than big items this month. If you are looking at the lower frequencies with the sunspots heading downhill, there is available the Top-Band DX Information Net meeting on Saturdays at 1600Z at 14,260 kHz. It might be well to watch that band while it is still with us. A couple of months back the FCC isued a Notice of Proposed Rule-Making (PR Docket 84-874) in which it is suggested that the 1900–2000 kHz portion of 160 be reassigned from amateur use to radiolocation needs. With the planned expansion of the broadcast bands, radiolocation services will be moved. A day or so before this proposal was released, the ARRL filed a Petition for Inquiry to determine the present use of nongovernmental radio location services in the medium-wave band area.

Up in the marine v.h.f. country, just above the 2 meter band, the FCC is reported moving to eliminate the operator license requirements. This is the "Restricted Radiotelephone Operators Permit," and the marine v.h.f. is from 156.275 to 162.000 MHz. Probably this will also apply to other areas in which the third class radiotelephone license has been required. The station license will be continued. Ten years back it cost $4.00 for this license, and $10.00 for the station license. The courts knocked out the fees, and now the FCC is reported considering the operator's license as little more than a paper-shuffling license.

R10 was on from Franz Josef Island a couple of months back. One can easily understand how the strange calls and prefixes can drive one to a computer. Also a couple of months back (October issue) Bob Locher, W9KNI, had a cover article in *CQ* about DXing on the computer; if you missed it you can still double back. Actually it was a DX game, but computers are found in many DXers' shacks. At the Northwest DX Convention a couple of years ago some of the locals were telling how they got so wrapped up with their computer that they had little time for DXing. But should a strange call or prefix show, you wonder, "Is it or isn't it?" You can fall back on the old reliable aphorism "Work em now, worry later!"

If you sometimes wonder about the German prefixes, DU9RG tells us that the DU prefix denotes a Class A license, DV a Class B, and DX or DZ club stations or sometimes a special event or field day effort.

Jim Smith, who was long heard from Papua-New Guinea and more recently has been heard from Norfolk and Heard Islands, is back in PNG again signing P29JS. Jim indicates that he will be there for a year or so and needs to recoup a bit after the expensive Heard Island effort of last year.

A couple of months back Newington asked

5 Band WAZ

Standings as of October 1, 1984

All 200 zones worked:

1. ON4UN
2. K4MQG
3. SM4CAN
4. AA6AA
5. W8AH
6. W6KUT
7. EA8AK
8. LA7JO
9. EA3SF
10. OH1XX
11. EA8OZ
12. WØSD
13. KØZZ
14. ON6OS
15. OK3TCA
16. K6SSS
17. ZL3GQ
18. OK3CGP
19. SMØAJU
20. OZ3PZ
21. I3MAU
22. I2ZGC
23. 4Z4DX
24. N4KE
25. K5UR
26. K9AJ
27. SM3EVR
28. LA5YJ
29. DL3RK
30. N4WJ
31. G3MCS
32. SM5AQD
33. WØMLY
34. IØRIZ
35. ON5NT
36. OH6JW
37. OK1AWZ
38. IV3PRK
39. DJ6RX
40. OH3YI
41. I4RYC
42. ZL1BIL
43. I4EAT
44. ZL1BQD
45. TG9NX
46. XE1J
47. F5VU
48. W3AP
49. YO3AC
50. K3TW
51. XE1OX
52. VE7IG
53. OK1ADM
54. CT1FL
55. WA1AER
56. N4RR
57. UWØMF
58. W4DR
59. OK1MP
60. W1NW
61. OE1ZJ
62. HB9AHL
63. HB9AMO
64. LA6OT
65. UR2QD
66. UK2RDX
67. ZS5LB
68. F6DZU
69. DL4YAH
70. LA7ZO
71. W9ZR
72. W1NG
73. VK9NS
74. N4KG
75. YU7DX
76. DL8MAG
77. OK3DG
78. ZL1BOQ
79. EA9IE
80. DL7HZ
81. DJ9RQ
82. EA5SP
83. EA2IA

The top 12 contenders for 5 Band WAZ:

1. DK5AD, 199
2. JA3EMU, 199
3. N4WW, 199
4. EA8XS, 199
5. K6YRA, 199
6. W8VUZ, 198
7. LA9GV, 198
8. W6GO, 198
9. K4CEB, 198
10. OK1MG, 198
11. W2YY, 198
12. N4JF, 198

287 Stations have attained the 150 zone level

CQ DX Awards Program

S.S.B.

1362	EA9KF	1366	WA6SLO
1363	EA3CLV	1367	AH9AB
1364	EA2AX	1368	WAØVBW
1365	EA3DDP		

C.W.

620	WAØVBW

S.S.B. Endorsements

310	EA2IA/314	275	N8BJQ/284
310	N2SS/311	275	K4LR/282
310	N4MM/311	250	EA3DDP/251
300	WØSR/307	200	NB8C/200
300	WD9IIX/302	150	EA3CLV/168
300	KB5FU/300	3.5/7 MHz	EA9KF
275	W6NLG/297	3.5/7 MHz	N8BJQ
275	VE7HP/296	3.5/7 MHz	K8VFV
275	KC8JH/293	3.5/7 MHz	WB4UBD
275	VE3FEA/292	3.5/7 MHz	WA6SLO
275	K1VHS/291	1.8 MHz	EA9KF
275	IØSGF/290	28 MHz	EA9KF
275	K8ZZU/289	QRPp	WAØVBW

C.W. Endorsements

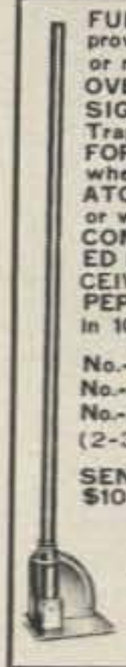
300	N4MM/307	275	K1VHS/280
300	WØIZ/303	275	DL1QT/276
275	WØSR/299	200	N8BJQ/238
275	WD9IIX/290	QRPp	WAØVBW
275	EA2IA/285		

Total number of active countries is 315. The basic award fee for subscribers to CQ is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

We admit to a fondness for faces in DX photos. In this instance the planned effort did not go as hoped, but there are many well-known DXers in the photo and it merits a second look. This was the group out to put Clipperton on the air last year. They got to Mexico, but were thwarted by transportation problems. Nevertheless, they have not given up. The dream lives! In the back row are W6SZN, N7NG, W6TPH, KK6X, DJ9ZB, F6GXB, F6LX, and FO8IW. In the front are N6BLN, FO8GW, FO8HL, W6OAT, and W6RGG. Franz Langner, DJ9ZB, in the back row is definitely one of the top worldwide DXers. His list of operations is impressive. Rusty Epps, W6OAT, has been on several efforts and was one of the operators on the first Kingman Reef effort. DXers around the world have heard Bob Vallio, W6RGG, putting on the late DX word on the NCDXC W6TI's DX report at 14002 kHz, 0200Z Mondays for close to two decades. A notable group. (W6NLG photo)

Say You Saw It In CQ

ALL BAND TRAP VERTICAL ANTENNAS!



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100 Watt (4:1, 6:1, 9:1, or 1:1 impedance - select one)	$ 8.50
Universal Transmatch 1 KW (4:1 impedance)	12.50
Universal Transmatch 2 KW (4:1 impedance)	15.00
Universal Transmatch 1 KW (6:1, 9:1 or 1:1-select one)	14.00
Universal Transmatch 2 KW (6:1, 9:1 or 1:1-select one)	16.50

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Pi Network. Low Pass Pi Network tuning — 1.5 to 30MHz. Heavy duty, silver plated continuously variable inductor with 25:1 vernier dial. 7000 volt variable capacitor and 15,000v switch selected fixed capacitors on output side. Tunes 40 to 2000 ohm antennas. Also provides harmonic suppression.

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CIRCLE 64 ON READER SERVICE CARD

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 315. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsements involving the issuance of a sticker is $1.00.

C.W.

W6PT	315	W6ID	311	N4KG	304	N5DX	291	K7ZR	280
K4CEB	315	K6LEB	311	WØIZ	303	I3OBO	290	I5XIM	280
DL7AA	314	K4XO	309	WA8DXA	302	WD9IIX	290	W2LZX	280
ON4QX	314	W4BQY	309	SM3EVR	300	W1WLW	289	K1VHS	280
W3GRS	314	DL3RK	308	W6SN	299	W4BV	289	N8MC	277
N4PN	314	W4OEL	307	WØSR	299	SM6CST	286	WB4RUA	277
W9DWQ	314	AA6AA	307	K3FN	298	WA2HZR	286	W6YQ	277
W8KPL	314	N4MM	307	DJ7CX	297	EA2IA	285	DL1QT	277
K9MM	313	W1NG	306	K3UA	295	K8LJG	284	NN4Q	276
N6AV	313	K1MEM	306	W9RY	293	WD9IIC	284	K4SE	275
K6JG	313	OK1MP	306	W7CNL	292	K8PYD	281	WØHZ	275
K6EC	312	K9QVB	306	K9IW	292	WA4JTI	281	WA4DAN	275
N6CW	311	W9BW	304	AB4H	291	YU2RTW	281	K4CXY	275

S.S.B.

K2FL	315	N4MM	311	W2LZX	303	VE7HP	296	N8BKF	284
W6EUF	315	WØYDB	311	IØMBX	303	I8ACB	295	N8BJQ	284
K6WR	315	N7RO	311	W6DN	302	I3OBO	295	WB3HAZ	283
W3GRS	315	W9SS	311	K1MEM	302	K9UAA	295	WD8PUG	283
W3NKM	315	VE1YX	311	N5FG	302	SM4CTT	295	VP9CP	283
DL9OH	315	LU3YL	311	W6FET	302	WA9PWN	295	XE1OW	283
W4UG	315	OZ5EV	311	W2FGY	302	XE1OX	295	VE3CKP	283
VE3MR	315	N2SS	311	K9HQM	302	WØIYR	295	VE3MV	283
IØAMU	315	EA4LH	310	KB8DB	302	KKØC	295	AE5B	282
F9RM	315	K6XP	310	KV2S	302	AI5I	294	CT1UA	282
VE3MJ	315	OE2EGL	310	WD9IIX	302	I8ZTE	294	KC8YM	282
W4EEE	315	DK2BL	310	G4CHP	301	NN4Q	294	AI9R	282
I8AA	315	I3LLD	310	VE3FJE	301	WDØBNC	294	VE3DLR	282
IØZV	314	K4XO	310	WB4NDX	301	K4SE	293	TG9EP	282
I8KDB	314	IV3YRN	310	WA3HUP	301	NA5W	293	K4LR	282
K6YRA	314	W2SUA	310	K8CMO	301	WD8MOV	293	I1POR	281
ZL1AGO	314	VE3GCO	309	W8ILC/QRPp	301	KB8KW	293	K9TI	280
ZL3NS	314	DL6KG	309	AI8S	301	KC8JH	293	N5FW	280
VE3GMT	314	N4PN	309	KU9I	301	WA4LOF	292	KA8T	279
EA2IA	314	VE7WJ	308	K9IW	301	I5BDE	292	KB5DN	279
XE1AE	313	W1NG	308	W6SN	301	WB4KTG	292	EA3KW	279
I4ZSQ	313	VK4VC	308	W1LQQ	301	ACØA	292	EA6DE	279
W9KRU	313	YV5AIP	308	W9RY	301	I2MOP	292	JH8NYK	279
YV1KZ	313	ZL1BIL	308	W4OHZ	300	VE3FEA	292	W6MFC	278
W3AZD	313	N6AV	308	I5EFO	300	VE3IPR	291	AI8M	278
ZS6LW	313	AA6AA	308	W8IMZ	300	N5AWS	291	K4BYK	278
DJ9ZB	313	K9BWQ	308	K9QVB	300	WB3DNA	291	I5EFO	278
W4DPS	313	N6OC	308	KB5FU	300	WB6GFJ	291	VE3IUE	278
N4WF	313	OZ8BZ	308	K3UA	300	W4JFE	291	K3LUE	278
K6JG	313	VE4SK	307	WAØTKJ	299	KB3OO	291	KB3KV	277
W9JT	313	K8PYD	307	I6PLN	299	K1VHS	291	KB8O	277
OE3WWB	313	N4KG	307	YU2RTW	299	JH4PRU	290	KP4EQF	277
OK1MP	313	IØMBX	307	KB9OC	299	KKØC	290	WBØUFL	277
VE2WY	312	K1UO	307	DJ7CX	298	W4BQY	290	W4PTT	277
F2MO	312	YU1DZ	307	K9SM	298	KZ2P	289	KBØSY	277
N6AW	312	W8JXM	307	I8LEL	298	YU7KV	290	I8XTX	277
K9LKA	312	WØSR	307	K8NA	298	IØSGF	290	W9NUF	277
W3GG	312	N4KE	306	K8VFV	298	JA5PUL	289	VE6PW	277
W9BW	312	W8PCA	306	WB4UBD	298	W9TA	289	N7ASL	276
I8YRK	312	W7OM	306	EA9IE	298	W7FP	289	WA6DTG	276
OZ3SK	312	W8ILC	305	XE1NI	298	K8ZZU	289	ZL1BOQ	276
CT1FL	312	WB1DOC	305	HP1JC	297	KØGT	288	WA4OPW	276
WØSD	312	W2CC	305	K5DUT	297	OK1AWZ	288	WA2FKF	276
K9RF	312	VK3JF	305	JH1VRQ	297	I8KCI	288	AI9U	276
K5OVC	312	LA7JO	305	WA4DAN	297	N2ATD	288	I8INW	275
YV5DFI	312	9H4G	304	KR9O	297	WØULU	288	W8LKG	275
WØSFU	312	WA4JTI	304	W6NLG	297	EA9IE	287	WB3CQN	275
4Z4DX	312	WA4WTG	304	WAØDCQ	296	AB9E	287	WB1EAZ	275
K8LJG	312	XE1J	304	K4CXY	296	KB9KD	287	VE7BSM	275
K6EC	311	KM6B	304	WD9IIX	296	W6BCQ	286	K8NWD	275
W4SSU	311	WD8MGO	304	VE4AT	296	VE3CYX	285	KI3L	275
K4MQG	311	VE3MRS	304	W4UNP	296	KB5RF	284	KA9ABC	275
I4LCK	311	XE1KS	303	KE3A	296

Here are a couple of the Carolina DX types. On the right is Ted Goldthorpe, WA4VCC, president of the Carolina DX Assn. On the left is Larry Sossoman, K4CEB. Note the number on the DXCC plaque on the table. You will find Larry in every DX Contest proclaiming, "I'm number one!" Perhaps you've even seen him at one of the Carolina college football games. (WA6GLD photo)

the FCC to issue a Declaratory Ruling that would prohibit states, cities, or any local governmental agency from enacting laws or ordinances seeking to regulate amateur radio. The FCC was asked to exercise "federal preemptive authority" to overturn any such local regulations which inhibit or prohibit effective and reliable amateur communications. Comments were due in early November and reply comments in mid-December. Possibly something will be heard on this matter about the time you are reading this. Some may wonder if this is striking out into new territory, but up in Canada the Canadian DX Association *Long Skip* reports that a few months back the North York City Council approved a local ordinance to control the height and placement of antenna towers and satellite dishes. But, the ordinance specifically excluded any installation operating under license from the Canadian government—such as amateurs, naturally.

As long as we are working the FCC beat, it might be noted that Art Reis, K9XI, has been calling for a congressional inquiry into the activity of the FCC's Office of Science and Technology. K9XI publishes "220 Notes" and has a feeling that the Science and Technology office pushed the Land Mobile Communications Council to file a petition aiming to share the 220 MHz amateur band with the commercial land mobile services. Some feel that the proposal came out of left field and caught other FCC agencies by surprise. The late word was that the FCC was not moving to do much with the proposal.

San Felix Island showed for the Deserving a couple of months back when CEØAA was heard a bit unexpectedly. Max and Fernando, the two Chilean military operators, did a lot of c.w. as well phone work, were on several bands, and wound up the operation in early November. There was a language problem and some heavy list operations. All this is to note that when a protest is heard on lists and any DX worked on a list is questioned and denounced, the question has to be raised as to just how one hurdles the language barrier. Then again, one can consider what one zealot proposed: Require that all DXCC counters have the QSO in English! That would show them, if one could take the idea seriously. QSLs for CEØAA go to Box 700, Santiago, Chile, the address of the Radio of Chile.

Back a bit we mentioned computers. Norm Koch, K6ZDL, had a standoff struggle with the WPX paperwork until he fed everything into a computer. That did it! Take a look at the leaders in the WPX program and you can understand Norm's problem. The computer also kicked up some duplications. Recently some clubs have been looking at the WPX Program as an ongoing activity for their local clubs, especially with the sunspot lowering the threshold on available DX. Send an s.a.s.e. to *CQ* if you want the full rules on WPX and the other ongoing *CQ* awards programs.

The *CQ* WW 160 Meter C.W. DX Test will be on later this month. Don't give up because the sunspots are not up; go where there is still DX to find. Next month the s.s.b. section comes on the last weekend, and then in March comes the *CQ* WW WPX S.S.B. Test. As the Hero of Mafeking would often say, "Be Prepared!" And Frank Anzalone expects every DXer to do his duty, even if it is 160!

Sunspot Cycle 21 continues to decline. The smoothed monthly sunspot number for October was expected to be 45. This January it is expected to be about 40. That smoothed running sunspot number comes from taking a 12-month average, centering things on the mid-point of the 12-month period. Thus, this month we should be getting the figure centered in the middle of last year. The idea is to

Say You Saw It In CQ

If you are an enduring DXer, you certainly have worked Lloyd, W6KG, and Iris, W6QL, Colvin. This photo was taken atop their QTH on the east shore of San Francisco Bay, one of their several towers visible in the background. This is also the site of one of the enduring folklore stories in west coast DX circles. When they were first settling into the new QTH, one morning Lloyd went to the top of the three-story apartment to check some antennas. A few minutes later Lloyd came up the stairs from street level. "I thought you were on the roof," Iris said. "I was, confirmed Lloyd, "but I took a short cut downstairs." In backing up to check the antennas, Lloyd tripped over the low edge of the roof and fell to the ground, landing on soft earth. After a moment he picked himself up and climbed back up to the stairs to surprise Iris. (WA8MOA photo)

smooth out the daily ups and downs and determine the trend. There is also the monthly mean. Last July it was 36.5; in June it was 45.2, these being the figures from a U.S. observatory, which are close, but not always the same as those coming out of the international center in Belgium. These were the monthly figures, not the 12-month smoothed running figures, but they do show how the sunspot count is declining.

Those who survived previous cycles know that DX always comes back even though some faint in spirit may voice doubts. One way is to study propagation conditions a bit more closely, look at the bands that come to life at the bottom of the cycle, the lower frequencies, and use every way possible to find where the DX is.

Sometime back we mentioned the twilight path, sometimes called the gray path, when you try to work from your twilight to DX areas also in twilight, be it morning or evening. Some have pointed out that they use the *DX Edge* along with the plastic Great Circle Slide to find out just where the twilight path might be. Tony Japha, N2UN, at Box 834, Madison Square Station, New York, NY 10159, can give you directions if you are unable to find a local source for these items. Knowing the paths helps, as well as remembering that the field around the earth which reflects signals is not a perfect sphere as some might think, but is more like a doughnut. During disturbed conditions, or when the cycle is getting flat, the polar paths are often dead. Some say that the ice packs absorb the signals, but others say that the signals fall into the hole in the doughnut. Anyhow, this is the time to experiment.

As long as we are waving our arms pointing the way to the promised lands of DX and other things, we will point to *Westlink* and note that there is nothing going to equal this as quick, solid, and needed information for any radio amateur. We continue to marvel at their work. DX bulletins are the essential items for the serious DXer. *Westlink Report* is essential for the informed amateur.

The Colvins should be out again. In the fall their plans were to return to Africa where they have already spent 2½ years DXing but still have a few countries to work. Mostly they will be working the southern and southeastern portion of Africa. All their QSLs go to Box 2025, Castro Valley, CA 94546, this being the address for the YASME Foundation.

The DXAC decisively turned down the proposal that Baker and Howland be made a new DXCC country. They were continuing to consider the Pribilofs and the division of Cyprus. Possibly you will be hearing something about this time. J5WAD should be in Guinea Bissau for most of this year, and there may be more BVs showing, with a number of locals there taking the license examinations. The endorsable 160 DXCC Award became available November 1st with contacts from November 1945 eligible. Bob Hastings, K6PHE, notes that there is no 6 meter category in the contests. You can check the WPX rules elsewhere in this issue to see in what bands the action is approved. Anyhow, Bob would like to run the 6 meter flag up the pole and see how many salute it.

Having brought things this far, we suspect we should think a bit more about Retired DXers. Did he mean them or us?

73, Cass, WA6AUD

QSL Information

This month's info was compiled with help from KA6A/9 and W9LNQ.

ND5K/DU2 to ND5K
FO8FB to WB6GFJ
KA1CI/FP to K1RH
F6GXB/TK to F6GXB
F8AMY/FC to DL4FF
FM4DJ to W5JLU
HH2Q to I2YAE
FV4AR to F6GFQ
I2DMK/IL7 to I2MQP
IY4FGM to I4IKW
KG4AW to KA4TAY
PA3CPG/LX to PA3CPG
RT1I to UB4IXZ
T32AB to N7YL
TI2WI to TI2J
TI4BGA to TI5BGA
UR1RWW to W7PHO
VK4BZZ to WB6GFJ
ZL8AKO to WB6GFJ
ZL1XI to WB6GFJ (for Jul 1, 1984 only)
3D2FB to WB6GFJ
4K8B to UA1MU
4N2KO to YU2BOP
CT2QN to Box 165, Angra, Azores
V85HG to P.O.B. 222, BSI, Brunei
ZZ2CW to PY2-Bureau
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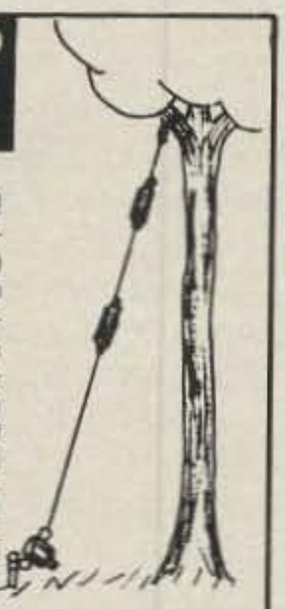

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Amateur radio is life itself to KH6BIH, and to us his story is a reminder to be thankful for the tapping of the keyer and the hum of the mic.

The Overcoming Ham

BY LEWIS H. STRAUSS*, AH6I/W3

Did you feel more than a little nervous when you walked into the FCC office to take an exam? Did your hand shake a little as you signed your name to the test? Dave Fraser, KH6BIH, never had those problems. He lost his eyesight as a child, and has never been able to go to an FCC office.

"Big deal," you say. "There are plenty of blind hams; I've talked to quite a few." You're right, of course. But, you can't talk to Dave; he's also deaf. Further, his body is virtually rigid except for the movement of his breathing, chest, and throat muscles. To make matters worse, his joints are locked, and he hasn't had any significant movement in his arms, legs, or even his head since he was a teenager, some 33 years ago.

"Well, then," you say, "surely this OM who is deaf, blind, and immobilized isn't on the air anymore. Right?" Wrong! Dave is on the air every day, and he is fully informed of local, national, and world events. He's even up to date on the comic strips.

Ham radio, as a hobby, is a "forest" of opportunity and possibility, and we are all acquainted with the various "animals" that inhabit this forest: the DXer, the Rag-chewer, the Traffic Passer, the One-Upsmanshipper, and so forth. But for Dave, ham radio is *Life, The Only Game In Town,* and his single contact with the world outside his home. None of this would have been possible, however, if it wasn't for Dave's 84-year-old father, David M. Fraser. The elder Mr. Fraser was a "sparks" in the British Navy in World War I, and so for fun, when Dave was a child, he taught young Dave the code. As Dave's senses began to fail when he was a teenager, his parents persuaded him to study amateur radio, and he was able to learn enough to pass the Advanced examination before his physical disabilities closed in.

Having a hobby poses severe problems for anyone as disabled as Dave. When not in bed, Dave "sits" in a wheelchair with a back support, leaning 45° to the rear, his arms on rests. In this position, anyone who knows c.w. can "talk" with Dave by tapping in code on his arm. For those who do not know code, there is a modified typewriter called a Tellatouch, which can be placed on a small pallet in front of Dave. When a key is depressed, the appropriate members of a group of wires are extended, and the tips of these wires can be felt and read as a Braille letter by Dave whose fingertip is inserted in a small hole in the back of the Tellatouch. Dave cannot read Braille in the conventional way blind people do because he cannot move his hand across a page. Dave's fingers are only about one-half the size of those of a normal adult and are much distorted from his illness. Yet, he still has remarkable sensitivity in the fingertips, and this is what enables him to use the Tellatouch.

Just after lunch every day Dave is moved to his rig. The transceiver is crystal-controlled in the 20 meter c.w. band, and his three-element Mosley TA33 is pointed permanently at the U.S. mainland from his home in Capt. Cook on the island of Hawaii. The rig has been modified by a friendly technician, who adjusted the offset of the audio so that a normal 600–1000 Hz tone is reduced to about a 50 Hz buzz. The speaker rests uncovered, face up, on the table so that Dave can copy code by placing his finger on the speaker cone. Dave's other hand is placed on his keyer. The same chest muscles that allow him to breathe and to speak allow him enough movement to operate the keyer, even though he has no movement in his arms, wrists, or fingers. And can he go! Dave can send and receive code at the rate of 20 w.p.m., with ease! And if you don't think that's an accomplishment, try sending with your shoulder, elbow, wrist, and finger joints locked, using only your chest muscles! Try copying 20 w.p.m. through your fingertips! Dave's a pretty good rag-chewer, and his replies are usually filled with gentle humor. That's why we call Dave "The Overcoming Ham."

Two mainland hams, W8MH and W9TDB, work Dave nearly every day, and they keep him informed on all manner of subjects, ranging from the comics to heavy politics. I work him ground wave from my new home 15 miles from Dave and also attempt to reach him when I am /W3. It doesn't take long to learn that Dave is far better informed than the average citizen, and that he never forgets anything you tell him. A couple of times I have given him some data and a year later slightly different data on the same subject, and he always reminds me of the difference. When President Reagan was shot, I called Dave's housekeeper and urgently asked that Dave be pushed to his rig. Once he was in place, I gave him a few paragraphs on the shooting. At the end of my transmission I asked whether he had copied the message, and Dave then proceeded to repeat the 10-minute message verbatim. Such is the memory of a man who, for 33 years, has seen nothing and who, for 13 years, has heard nothing.

So with all the negatives one sometimes hears about ham radio, it is reassuring to think that it really is important, worthwhile, and to some people like Dave, absolutely necessary for life. And, it reminds us to QRL so as not to jump on his frequency. CQ

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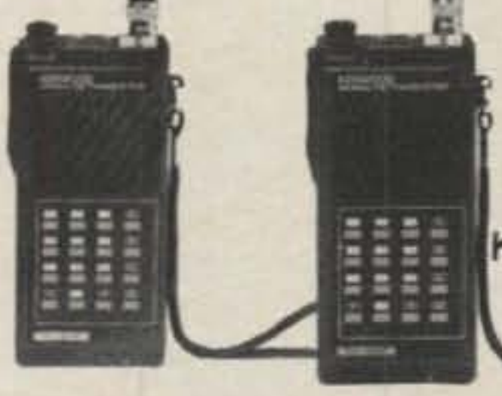

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Math's Notes

a feature by
IRWIN MATH, WA2NDM

A LOOK AT THE TECHNICAL SIDE OF THINGS

With the increasing popularity of communications between individual pieces of electronic equipment, it is no wonder that sooner or later most people become acquainted with the most common data communication standard in use today—RS-232. There is a general uncertainty regarding the practical application of RS-232, however, and it is the purpose of this column to try to clarify matters somewhat.

RS-232 is a United States Electronics Industry Associates (EIA) standard for data communications between equipment by means of alternating pulses which can be in one of two states—either high (logical 1) or low (logical 0). These states are often called "mark" (logical 0) and "space" (logical 1), but this is just for convenience. The logical 1 level, according to the EIA, must be within +3.75 to +25 volts d.c., while the logical 0 level must be within −3.75 to −25 volts d.c. As a result, RS-232 signals are bi-polar with 0 volts normally an unacceptable level. In addition to voltage levels, there is also a maximum rate at which the pulses may be sent, and this rate is 20,000 bits per second, or in non-computer language, a 10 kHz square wave. Slower rates, all the way down to d.c. (logical 0 or logical 1 continuously) are also employed, depending on the equipment being used.

Fig. 1 shows a typical RS-232 data stream. Load impedances, incidentally, are typically 3000 to 7000 ohms, which limits the recommended reliable transmission range (by the EIA) to 50 feet.

The RS-232 signals are usually interfaced by means of the 25 pin connector shown in fig. 2. This connector can be male or female, and the number of pins used depends on the type of equipment being interconnected. As little as 3 pins, or as many as a dozen or more, may be employed.

The EIA breakdown of all pin functions is indicated below. However, since manufacturers often interchange pins and functions, this list is unfortunately only a rough guide. The explanation of the various pins is as follows:

PIN 1 Case Ground: utilized for safety, noise reduction, etc., not normally used with the signal at all.

PIN 2 Transmit Data: utilized for pulses to be transmitted.

PIN 3 Receive Data: utilized for pulses to be received.

PIN 4 Request to Send: utilized to "ask" if external equipment is ready to receive data.

PIN 5 Clear to Send: utilized to receive "answer" from the "question" asked by pin 4.

PIN 6 Data Set Ready: utilized to indicate that the equipment is ready to use.

PIN 7 Signal Ground: utilized as signal common for all pins being utilized.

PIN 8 Data Carrier: utilized to signal that data is going to be or is being received.

PINS 9, 10, 11 Not normally used.

PIN 12 Secondary Data Carrier: like pin 8, but for secondary channel.

PIN 13 Secondary Clear to Send: like pin 5, but for secondary channel.

PIN 14 Secondary Transmit Data: like pin 2, but for secondary channel.

PIN 15 Transmitter Clock: utilized as clock input for synchronous transmissions.

PIN 16 Secondary Receive Data: like pin 3, but for secondary channel.

PIN 17 Receiver Clock: utilized as clock output for synchronous transmissions.

PIN 18 Not normally used.

PIN 19 Secondary Request to Send: like pin 4, but for secondary channel.

PIN 20 Data Terminal Ready: same as pin 6.

PIN 21 Not normally used.

PIN 22 Not normally used.

PIN 23 Not normally used.

PIN 24 Same as pin 15.

PIN 25 Not normally used.

While all of the above information might seem formidable, most equipment uses only a few pins. Systems in which computers are hooked to peripherals, such as printers, plotters, modems, etc., usually utilize only pins 2, 3, 6, 7, 8, and 20 and often not all of these. In computer-to-computer hookups, or industrial data acquisition devices, often only pins 2, 3, and 7 are used. It really depends on the equipment. In RS-232 all of the signals used, however, must follow the bi-polar levels outlined previously if they are to adhere to the published EIA specifications.

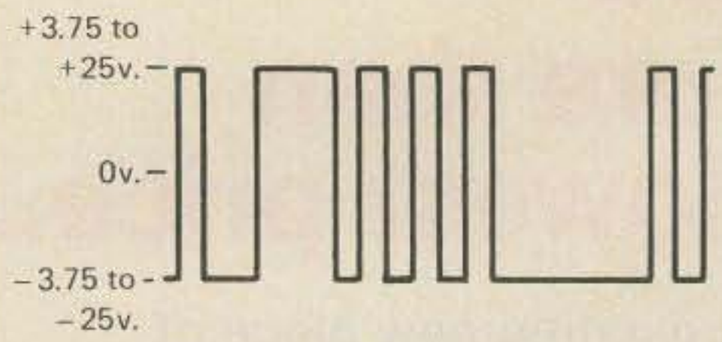

Fig. 1– A typical RS-232 bit stream.

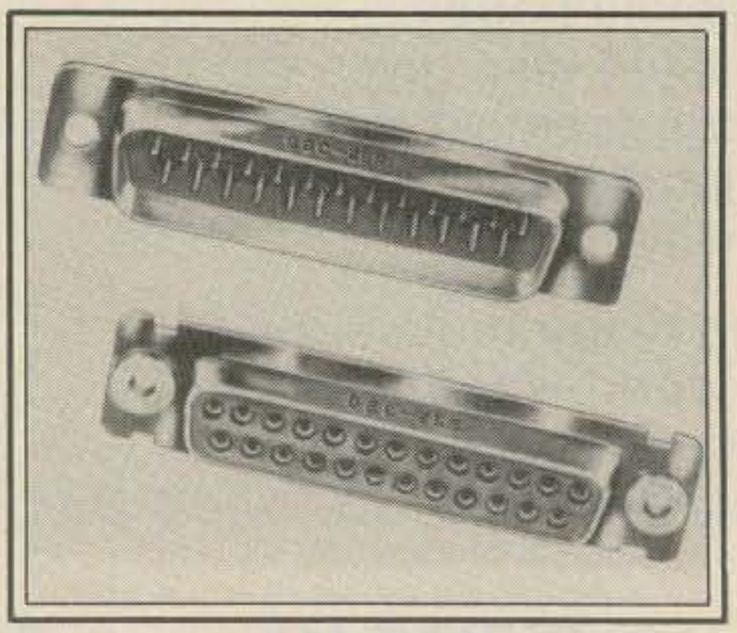

Fig. 2– A typical DB-25 connector.

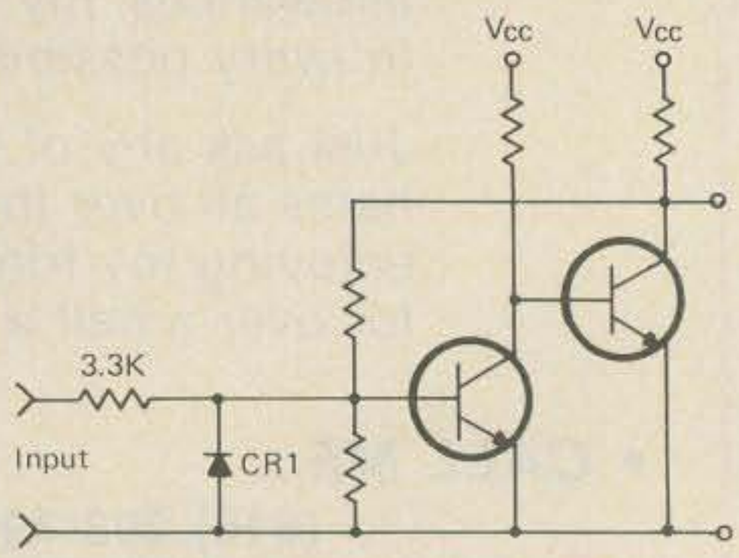

Fig. 3– An MC1489 input circuit.

There are certain instances in which the formal specification does not have to be rigidly followed. These involve equipment utilizing certain integrated circuit input and output chips, particularly the very popular and common Motorola MC1488 and MC1489 RS-232 driver and receiver. These chips will, of course, interface with standard bi-polar signals, but will also work with a pseudo-TTL signal. The input to the MC1489 is shown in fig. 3. It should be noted that at voltages from +3.75 to +25 volts (RS-232 logic 1) the input stage turns on in the normal manner, and the rest of the chip senses a logical 1. Below +3.75 volts, however, the input stage does not turn on, and for negative voltages all the way to the −25 volt limit of the specification, only the shunting diode, CR1, conducts. The input transistor stays off. This translates to the simple fact that a logical 1, for this chip, is +3.75 to +25 volts, while a logical 0 is +2 volts or so, through zero, down to −25 volts. Zero volts is logical 0, like TTL. In fact, a TTL signal working from 0 to 5 volts will be indistinguishable from a true RS-232 signal by the MC1489. The MC1488, however, does produce bi-polar signals.

In instances in which equipment is to be built using RS-232, the RS-232-to-TTL circuits shown in fig. 4 will serve to make the input conversion simpler. Notice that this circuit uses the integrated circuit scheme of ignoring the negative portion

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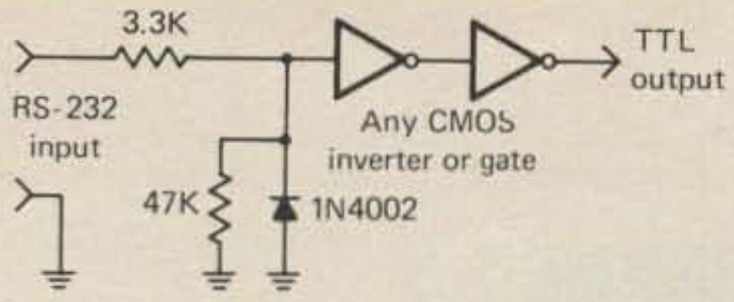


Fig. 4– An RS-232-to-TTL converter.

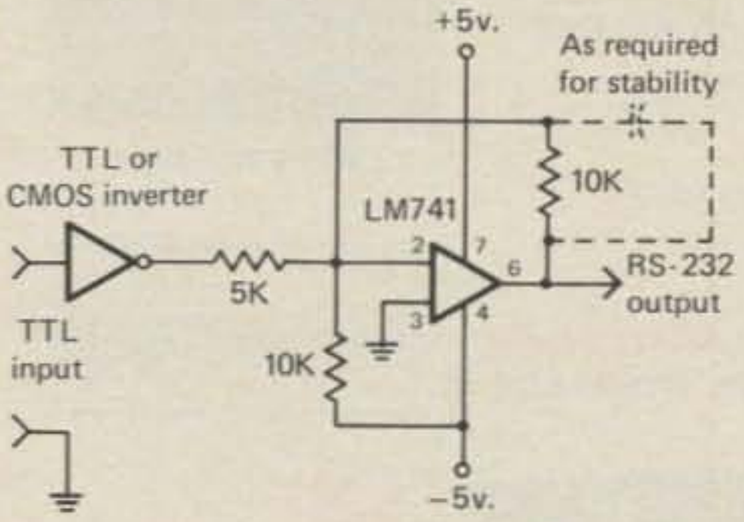
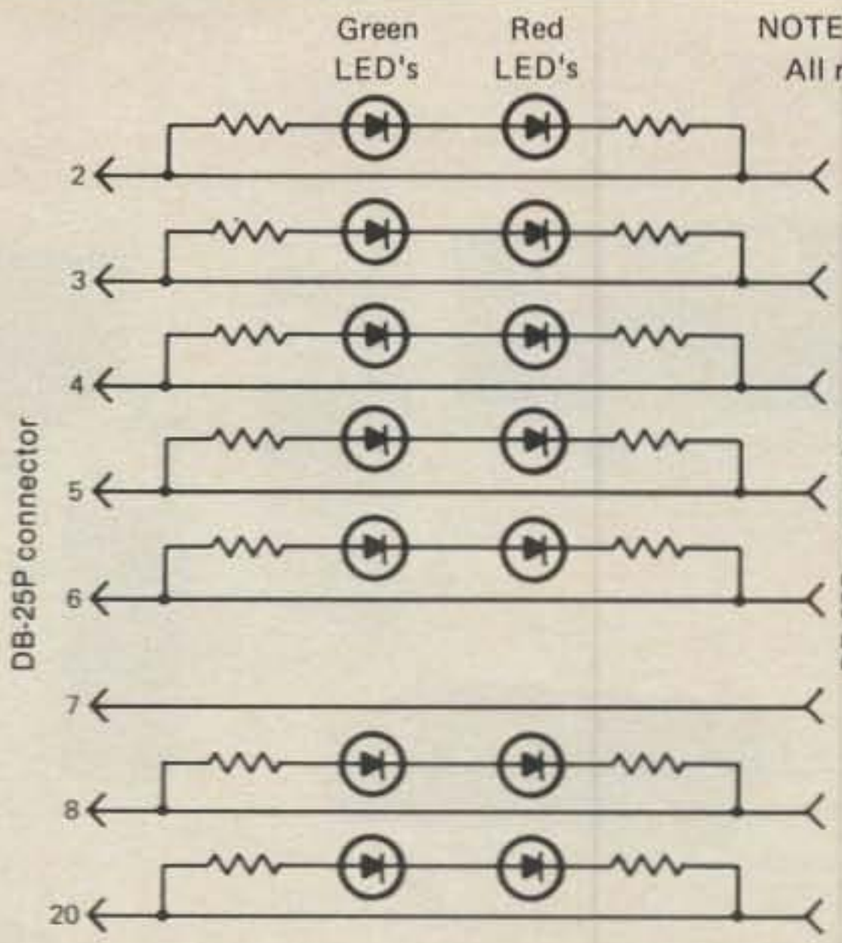


Fig. 5– A TTL-to-RS-232 converter.



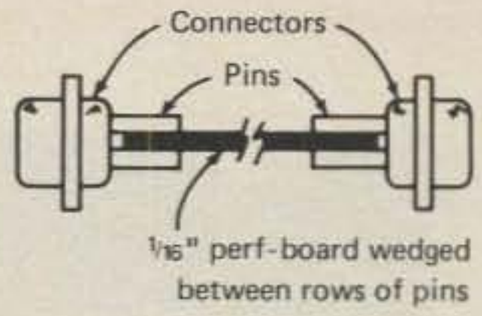


Fig. 6– Schematic and assembly detail for breakout box. The green LEDs indicate a plus voltage, and the red LEDs a minus voltage.

of the input. The circuit shown in fig. 5 can be used to make the output TTL-to-RS-232 conversion and will require a negative supply to fully comply with the specification.

In conclusion, when interfacing with RS-232 signals it pays to first read and then reread all you can about the specific pin assignments before you start. Often this will clear up any misconceptions. If the proper documentation is not available, the simple accessory "breakout connector" of fig. 6 will allow you to see what is going on as it happens. This easily built device will light the appropriate LED for logical 1 and should go a long way toward clearing up the confusion.

73, Irwin, WA2NDM

P.S.: I would like to thank all *CQ* readers who have written to me asking that I reinstate "Math's Notes." Personal business commitments unfortunately have made a regular monthly column, as in the past, impossible. I will try, however, to do a column occasionally, as time permits, and I sincerely appreciate your kind comments.

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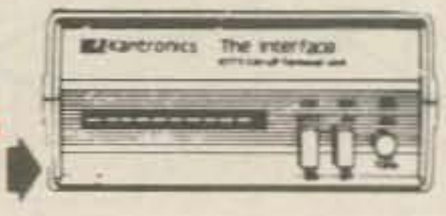
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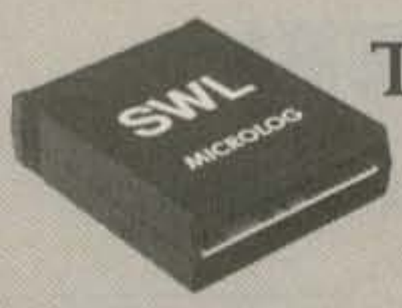

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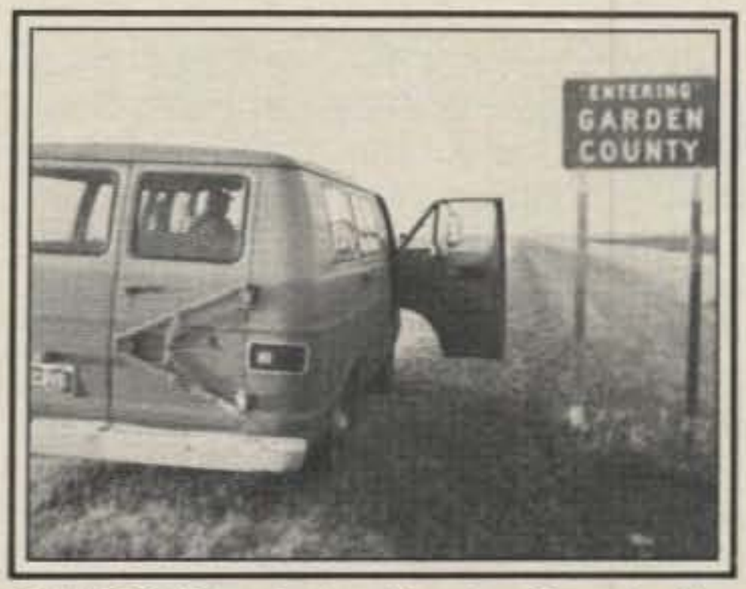
CIRCLE 65 ON READER SERVICE CARD

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

Bill, KCØVB, and Sandie, KCØVA, at their station in Englewood, Colorado.



Bill, KCØVB, entering Garden County, Nebraska, in the middle of the Great Plains. (Photo by Sandie, KCØVA)

The story of the month as told by Sandie and Bill is:

Sandie Miller, KCØVA
All Counties #479, 7-1-84
and
Bill Miller, KCØVB
All Counties #440, 1-30-83

"'QRZ, this is KAØDGU and KAØDGV, mobile on the Dodge/Washington County line in Nebraska.'

"That simple statement was really the start of our county hunting activities on September 4, 1981. The Dodge/Washington County line was the first time we put out a county; up to that time we had only collected them. That evening was a 'make or break' situation for us. When the first QRZ went out and a whole bunch of calls came back, it was almost a 'break.' However, someone cut in and told everyone to take it easy, as this was our first time at mobile operating. The next QRZ resulted in at least one decipherable call, and we were off and running. Since then we have put out over 150 different counties in 5 states and are looking forward to many more. Putting out the counties is much more fun than collecting them, as far as we are concerned.

"We have been able to see parts of the Colorado Rockies and the central plains that we would never have ventured to otherwise. Now those little gray lines on the map mean something to us. They actually are roads that are passable and just might get us to a county line, or a shorter route to a new county. Besides, the scenery is much more interesting than that on the interstate highways.

"Since putting out our first county, we both have upgraded and have new calls,

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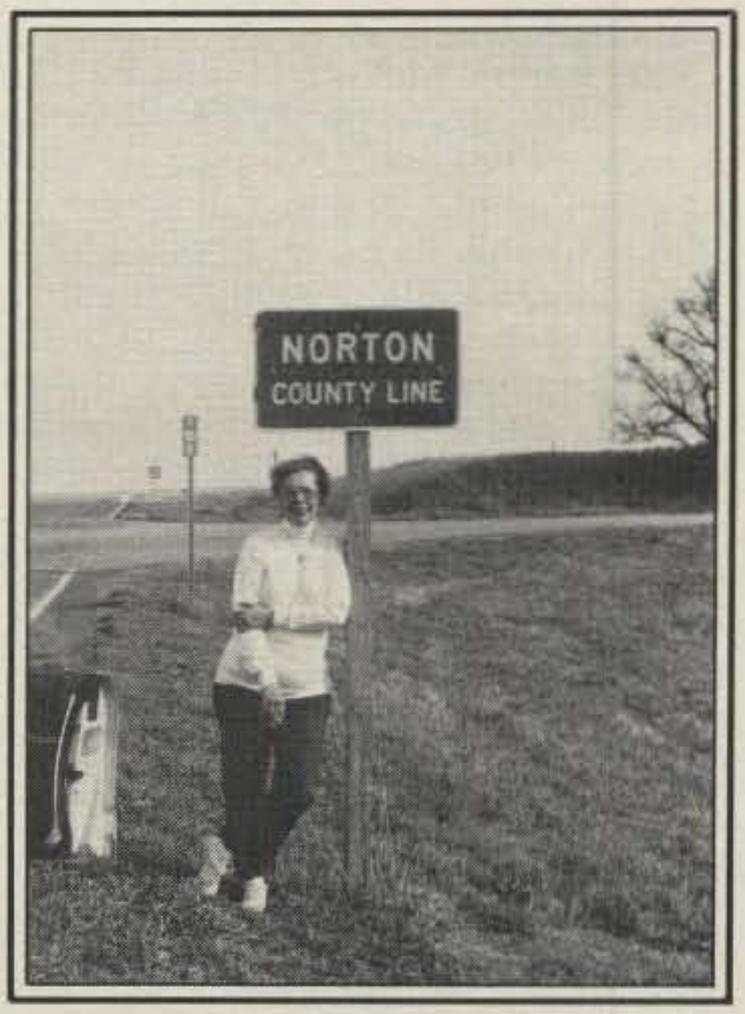


Sandie, KCØVA, at the Norton County line in Kansas. (Photo by Bill, KCØVB)

so you won't be able to find us on 14.336 as KAØDGU and KAØDGV. Our new calls are KCØVA and KCØVB. KCØVB earned USA-CA All Counties #440 on 10-30-83 and KCØVA earned USA-CA All Counties #479 on 7-1-84. With the first and most difficult time finished, we now play around with chasing YL's, W6CCM Bingo, and USA-CA numbers, as well as working the counties for the second time around. KCØVB is currently at the 2000-plus mark for the second time around, and KCØVA is still enjoying the release of pressure from the first time and not planning to work the counties for the second time around. Who knows. That may change. After all, where on the bands can you find quite the same feeling of friendship as on the Mobile Emergency and County Hunters Net?

"To digress a bit, we earned our Novice licenses in January 1979. There are three of us in the family who are hams. Our son is currently KCØUZ, and has put out a county or two on the net as well as worked a few. He is not actively chasing counties right now, since he is in OCS for the United States Navy. Once he finishes his schooling, we may be able to hear him put out a couple of counties submarine mobile! We also have a daughter who is not a ham. She isn't the least bit interested in the hobby, but thinks it is great that the rest of us are. Her affectionate name for us is 'The Beepers.' She has met and enjoys many of our ham friends, but just is not interested in becoming one of the group. She and our granddaughter are living in town now while her husband is serving with the United States Air Force for 15 months, so we have to spend some time spoiling the little one. (Maybe we can make a ham out of her!)

"After earning our Novice class tickets we all spent several months on the Novice bands before trying to upgrade to Technician or General class. Upgrades came at different times, and finally in the spring of 1981 we all passed the test for General class licenses. Then in a last try effort all three of us passed the test for Advanced class within two weeks of each other in the spring of 1983.

"In 1980 we attended the Denver MARAC Convention at the urging of several of our local ham friends who said it would be worth the effort. It was! Finding out what county hunting is all about was a real learning experience. You've got to be crazy to want to go for 3076 contacts! At least that's what we thought then. Now we're convinced! The county hunters we met in Denver did a superb job of convincing us that this was really the group with which we should become involved. We have never met a group as friendly and open as the county hunters. They welcomed us and told us all about the game, even going so far as to see to it that we had all the supplies and literature we needed to get started.

"We started by monitoring 14.336 until we felt we could get in there and work a few without making complete fools of ourselves. Then slowly we began to work the counties. It wasn't until the run in Nebraska that we really felt that we wanted to go for it, and we've been going for it ever since.

"Besides ham radio, we also enjoy traveling, reading, spectator sports, and just being together. Our 25th wedding anniversary was last year, as was the total emancipation of our last child from parental control, so who knows what the parents may get involved in next.

No - 91 - 92

Special Honor Roll
All Counties
#483 Dick Obrecht, N8CIJ, 9-28-84

USA-CA Honor Roll

3000		2000		1000	
N8CIJ	512	K8KIR	627	KD2DE	855
		N8CIJ	628	N8CIJ	856
2500				SM5BFC	857
K8KIR	572	**1500**			
N8CIJ	573	N8CIJ	696	**500**	
				N8CIJ	1974
				OK2BDP	1975

"We are also active in our local mobile club, MARCCO (The Mobile Amateur Radio Club of Colorado). Although the club is mostly composed of county hunters, its primary purpose is to promote all sorts of mobile h.f. operations. We are just getting the club off the ground and have several awards for working mobile stations. In 1982 and 1983 the club put out all counties in Colorado, mobile, in one day, and we participated in these activities. It was a fantastic event. The bands held up long enough, and there were plenty of volunteers to assist us as net controls. Several of the club members, including ourselves, have operated mobile for Field Day. Even though there is no special award for mobile, it is a challenge and fun besides.

"At the moment both of us are enjoying a sort of winding down period. We just relinquished offices in the local club and Sandie has given up a VP position in the ARNS. Bill is still the MARCCO Awards Chairman, and we are both on the Awards Committee for MARAC. County hunters are just too nice a group to leave. We may wander off for a while, but it sure is nice to know that there is always a meeting place where we can find our friends again. The friendships that have developed from this activity will not vanish into space. They are here to stay. County hunting is unlike any other activity we have encountered: no matter how many times you work the counties, there is always another way to work them. You can't ever really be finished chasing counties. That's nice, because that means we can all stick around for a long time to come.

"In closing, we wish to thank all the many, many mobiles and fixed stations who were instrumental in our finishing all 3076 counties. We cannot attempt to list them all here, as that would take the better part of a whole page. However, there are two who deserve some special recognition. NØCOL and NØCKN, Gwen and Jerry, gave us both the last one for the 'whole ball of wax,' and they deserve our special thanks. We surely did enjoy those contacts!

"We will be seeing all of you on the net. Good hunting, 33, 73, 88 to each and all of our many county hunter friends—Sandie, KCØVA, and Bill, KCØVB."

Awards Issued

Dick Obrecht, N8CIJ, finished them all, SSB, Mobile, and qualified for All Counties #483, 9-28-84.

K8CIJ, Lester M. "Bud" Flake, added USA-CA 2000 #627 and USA-CA 2500 #572, 9-25-84, All A-1, to his fine collection.

Tom Ross, K9GTQ, continues to add endorsements and now has his All Counties #250 endorsed through USA-CA 2500 #283 all on 75M, 9-10-84.

Joe Carpenter, KD2DE (ex-KA2PQW) has qualified for USA-CA 1000 #855, 9-10-84.

Kjell "Ken" Larsson, SM5BFC, has added the gold seal for USA-CA 1000, 9-29-84, to his certificate.

USA-CA 500 certificates went to:

N8CIJ, Richard J. Obrecht, #1974, 9-28-84 endorsed all SSB/Mobile/20M.

Miloslav Styblo, OK2BDP, #1975, 9-28-84, Mixed.

New Awards

Short Wave 5 Band DX CC Award. This award is sponsored by the International Short Wave League for verified contact/reception of 100 different countries on each of 5 separate bands (500 contacts in all). Send GCR list of QSL's together with 1.50 U.K. or $5.00 U.S. or 10 IRC's (ISWL members free) to: ISWL Awards Manager, Mr. Clifford Tooke, 6 Chelmer Avenue, Rayleigh, Essex, SS6 7TB, England.

Short Wave 5 Band DX CC Award sponsored by ISWL.

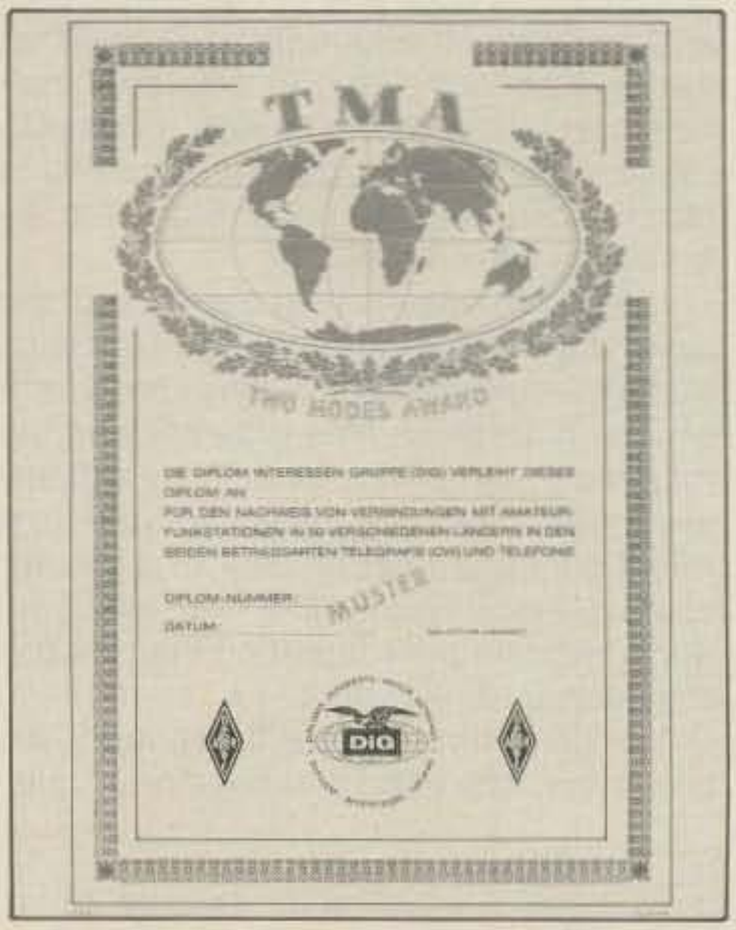
Continental Award. For verified contact/reception of 10 stations in each of the 6 continents, a total of 60 QSL's. Send GRC list of QSL's together with 1.50 U.K. or $5.00 U.S. or 10 IRC's (ISWL members free) to: ISWL Awards Manager, Mr. Clifford Tooke, 6 Chelmer Avenue, Rayleigh, Essex, SS6 7TB, England.

DIG Diplom 77. The DIG Diplom 77 is awarded by DARC. It is necessary to have worked (heard) 77 DIG members in at least 7 different countries, but only 7 × 7(=49) DIG members in the applicant's own country after January 1, 1977. The diploma is available for contacts in c.w. only (c.w./heard) mixed modes and bands, on the v.h.f.-u.h.f. bands only (V.H.F. Award) and for s.w.l.'s (heard contacts). Do not send QSL's. Send only GRC list and fee of 7 DM or 10 IRC's to Award Manager, Henry Bielinski, DC6JG, Wotanweg 21, D-2390 Fiensburg, West Germany.

Continental Award sponsored by the International Short Wave League.

DIG-Diplom 77, sponsored by the Diplom Interessen Gruppe.

Two Mode Award (TMA). The TMA is an award offered by the DARC and is available to all licensed radio amateurs and s.w.l.'s. All contacts must be on or after January 1, 1962. Work on c.w. 50 different countries, including Germany and all 6 continents, and again on s.s.b. the same different countries. DXCC countries list determines the valid countries. Send GCR list and fee of 7 DM or 10 IRC's to Award Manager, Henry Bielinski, DC6JG, Wotanweg 21, D-2390 Fiensburg, West Germany.



Two Modes Award, sponsored by DIG.

Ken, SM5BFC, and SM5HYL at their station in Grillby, Sweden. Ken just received USA-CA 1000 #857.

P.A.R.C. Award. The Peterborough Amateur Radio Club is offering a distinctive Bicentennial Certificate for contacts with stations in Peterborough, Ontario, Canada during 1984. Ontario stations contact five, other North American stations contact two, and DX stations contact one amateur station in Peterborough during 1984. Use any band, any mode. Send $1.00 and a list of contacts, as well as date and time of contact (no QSL cards required) to: Peterborough Amateur Radio Club, P.O. Box 1205, Peterborough, Ontario, Canada K9J 7H4.

VFN Anniversary Certificate. An 8″ × 10″ certificate is being offered by the Virginia Fone Net in commemoration of 50 years of continuous traffic net operation on the 75 meter band to handle traffic into, through, and out of the state of Virginia. The net has a membership of approximately 150 registered and numbered and licensed amateurs. Membership information may be obtained from any Net Control or will be furnished with your certificate if requested.

To obtain this handsome multi-colored certificate, the applicant must make 2-way contact with 25 or more VFN Members on any band except during Net operation, which contacts will not be accepted. Net time is daily on 3.947 MHz at 1600 and 1930 EST.

Send log information consisting of call of station worked, time, name, and VFN number of station worked to: Bill Redmond, K4IEC, 917 Rockspring Drive, Winston Salem, NC 27105. The contacts will be verified from your list. Include a #10 s.a.s.e. and $1.00 U.S. for handling along with information, or $2.00 for a "flat pack" envelope. All certificates will be serial numbered and hand-lettered with recipient's name and call. Contacts and requests must be made between September 30, 1984 and June 30, 1985. VFN members are asked to keep a log of those stations requesting contact information for verification.

Notes

Another year has gone into history. I hope 1985 will be good to you and yours.

73, Dorothy, WB9RCY

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- Built-in Speaker on RS-12S and RS-20S.

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- REGULATION: ± 0.5 volts no load to full load & low line to high line.

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RS-50A, RS-50M, VS-50M	37	50	6 × 13¾ × 11	46
RS-35A, RS-35M, VS-35M	25	35	5 × 11 × 11	27
RS-20A, RS-20M, RS-20S, VS-20M	16	20	5 × 9 × 10½	18
RS-12A, RS-12M, RS-12S	9	12	4½ × 8 × 9	13
RS-10A	7.5	11	4 × 7½ × 10¼	11
RS-7A, RS-7B	5	7	3¼ × 6½ × 9 4 × 7½ × 10¾	9
RS-4A	3	4	3¼ × 6½ × 9	5

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CIRCLE 138 ON READER SERVICE CARD

World of Ideas

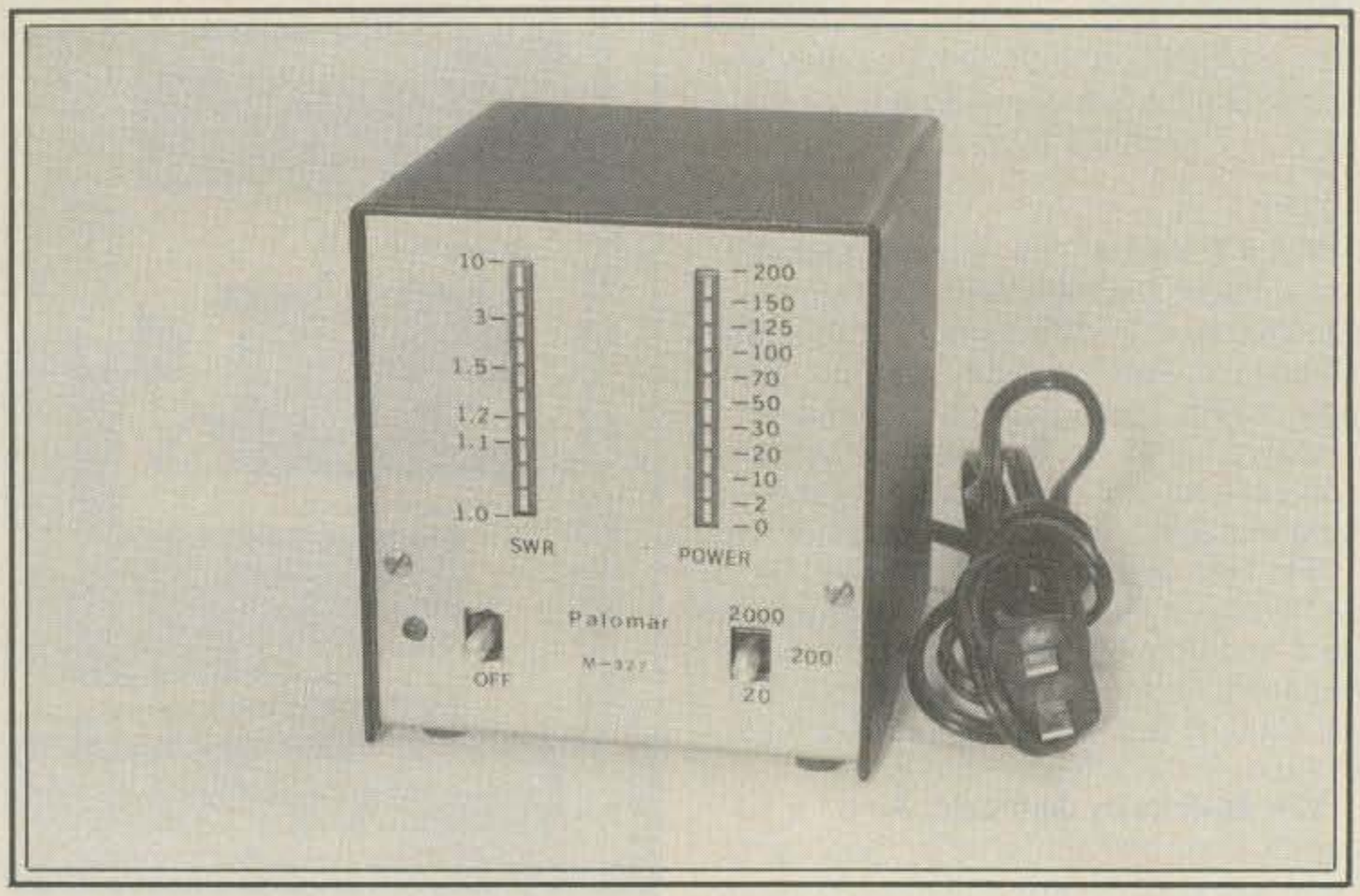
a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Straight Talk On P.E.P.'s and S.W.R.'s

Two of the most frequently misunderstood areas in amateur radio today involve calculations of s.s.b. power levels and effects of reflected power in antenna systems. Variations in individual voice characteristics, analog meter movements, and amplifier designs set the stage for intermixing values relating to p.e.p. input, c.w. input, and r.f. output values. Likewise, techniques for determining those variables often reflect "personal interpretations" more than actual facts. S.w.r. confusion often relates to idiosyncrasies of transmission lines and differences between tube and transistor power amplifier stages. Rather than contributing more fuel to those eternal fires, this month's column will discuss each area from a common-sense viewpoint and present some simple and understandable techniques for their evaluation and use.

Before proceeding with this discussion, I should point out that electronic variations within our amateur radio world equate both technically and mathematically. Also, energy can't be created or destroyed, but merely changed in form. An amplifier operating with 2000 volts and 500 ma input produces less than 1000 watts output, for example, and that difference is its energy conversion efficiency. A beam antenna achieves its forward gain by concentrating random sprayed energy into a single direction. S.w.r.'s of 3 or 5 to 1 may be usable in some cases, but reflected energy must be dissipated somewhere as heat. One way or another, everything thus tallies with zero remainder. Amateur radio's magic is within its boundless communications, not its utilization of established electronic technologies.



Peak-reading wattmeters such as this Palomar Engineers M-827 eliminate "guesstimates" in r.f. output levels of s.s.b. Naturally, we endorse running less than the legal limit for band congeniality and long lifespan of equipment. (Photo courtesy Palomar Engineers)

R.F. Power Levels

During the early years of radio, r.f. power calculations were a simple matter for U.S. amateurs. Plate voltage times current equalled input power, with stage efficiencies relatively open to personal ingenuities. An amplifier biased for class B linear operation was (and still is!) 50 percent efficient. Amplifiers operated non-linear class C realized efficiencies around 75 percent. Assigning hypothetical figures to those parameters, we thus have: 2000 volts × 500 ma = 1000 watts input. Fifty percent of that value is 500 watts output; 75 percent of that value is 750 watts output.

Misinterpretations of power levels and meter readings began with the advent of s.s.b. and 2000 watt p.e.p. input limits. On one hand some amateurs considered an 811-A type amplifier operating "key down" with 1700 volts and 589 ma as one kw d.c. and 2 kw p.e.p. input (actually, that's 500 watts s.s.b. average and one kw p.e.p.). On the other hand, some amateurs using power-capable 4-1000 type amplifiers loaded them to "key down" conditions of 2000 volts at 1000 ma and then "talked up" the plate meter reading until voice peaks hit 900 ma (that's roughly 3600 watts p.e.p. input to such "big bottles"). The proverbial scapegoat in those situations involved slow movements of analog meters and each person's interpretation of "slow." Generally speaking, analog meters indicate s.s.b. average levels rather than peaks. That average-to-peak ratio is often considered 1:2, but those figures are definitely not conclusive. Another noteworthy point involves "talking up" 1 kw amplifier meter readings to indicate voice peaks approaching that unit's maximum output. The extended time average for such readings might seem impressive to some operators, but the results are heavy amplifier saturation and signal distortion/splatter. As a means of rectification, let's substitute some more appropriate values in the previous statements. You can alter these to fit your own setup. A properly tuned 1 kw amplifier operating under "key down" conditions of 1400 volts and 700 ma will produce roughly 550 watts output. During s.s.b. transmissions, the current meter shouldn't kick above 200 ma average (560 watts input, assuming 1:2 meter ratio) and 400 ma on peaks (1120 watts input—a slight s.s.b. "push," but okay). The output meter will probably read 150 watts average, with 250 watt peaks. Why these low values? Again I repeat: Analog meters are slow moving devices, and wattmeters are usually the slowest. Analog meters are not accurate for estimating s.s.b. p.e.p.'s.

How can one accurately and reliably measure s.s.b.'s seemingly elusive levels, and how can super power stations honestly comply with our recent 1500 watt p.e.p. limits? Simply construct a peak-reading r.f. wattmeter such as described on page 48 in the August 1983 issue of *CQ*, or use an r.f. peak-following device such as an oscilloscope/cathode-ray tube and view true peak power dis-

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Say You Saw It In CQ

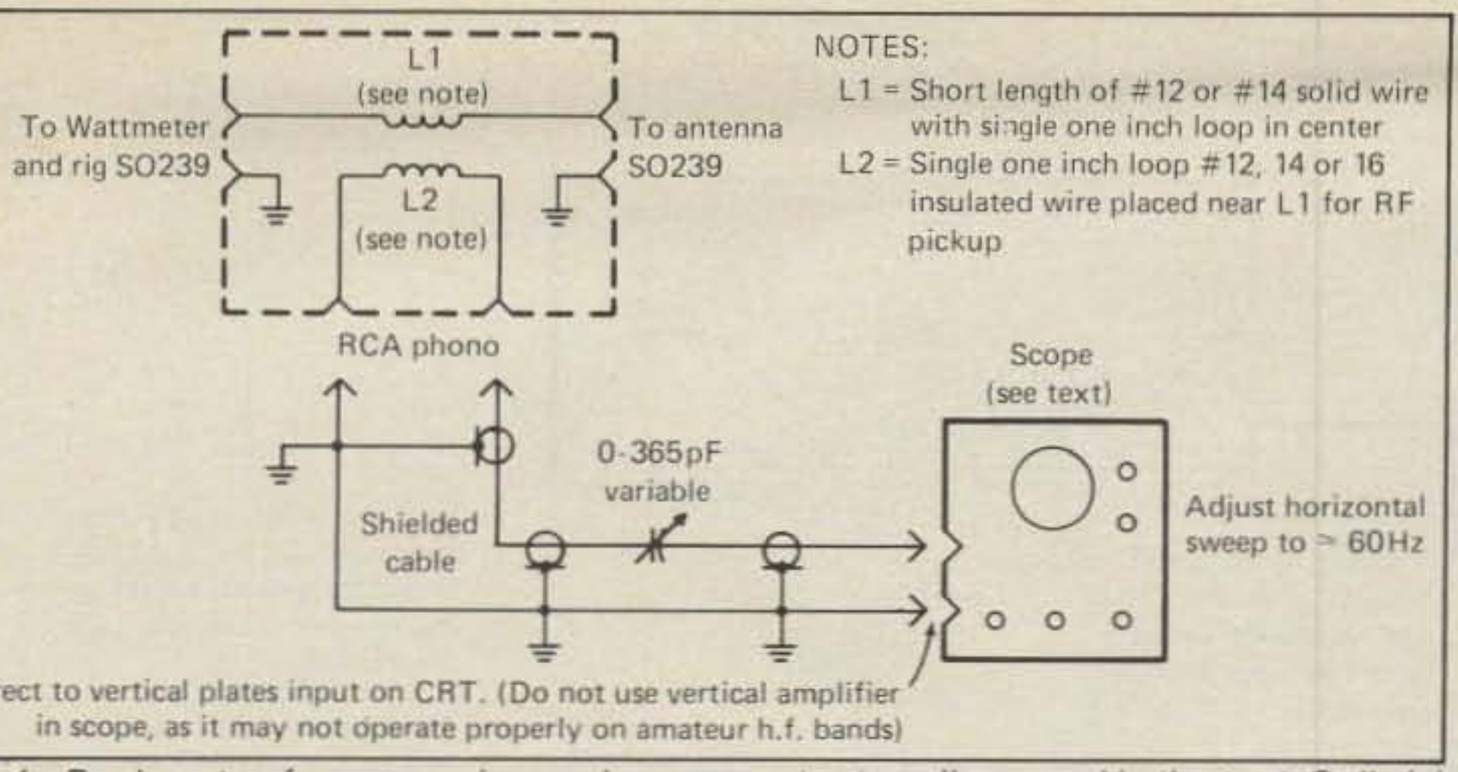

Fig. 1– Basic setup for measuring s.s.b. p.e.p. output as discussed in the text. Coils L1 and L2 are insulated from each other and enclosed within minibox. Shielded cable interconnects pickup unit directly to CRT's vertical plates. Setup is calibrated by station's wattmeter, then used to display peak power levels.

plays for yourself! The latter is easily accomplished by sampling a small portion of transmitted r.f. energy and directing it to a cathode-ray tube's vertical plates—the same basic arrangement used for checking s.s.b. linearity and described in many handbooks (see pages 166 and 167 of the ARRL's *Single Sideband for the Radio Amateur*, or W4FA's articles in the October and December 1982 issue of *CQ*, for example). A single-turn loop of insulated wire is placed near an "opened section" of transmission line (a small minibox fitted with SO239's and containing a single loop of heavy, bare wire. See fig. 1.). A variable capacitor of 365 to 1200 pFd (value isn't critical) is used for sampled signal attenuation, and resultant output is directed to a cathode-ray tube's vertical plates. The CRT's vertical deflection is then power-calibrated using "key-down" conditions and the station's wattmeter. Assuming the CRT's screen is marked with a grease pen, a peak-reading wattmeter is produced. This basic setup lets you see exactly what your rig develops (or doesn't develop) in r.f. output.

Some of you are probably asking if there is an easier way (!) of checking peak outputs. Yes, several ways. A "full blown scope" really isn't necessary. You can use a "magic eye" tube, a "stereo tuning eye" tube (remember Hallicrafter's HA8 "splatter guard"?), or construct a simple CRT displaying circuit. In the latter case, merely apply 60 Hz a.c. sweep to horizontal plates and sampled r.f. to vertical plates. Think creatively. Anything that responds to peak rather than average values works great. I haven't yet tried a Miller Malt neon sign, but if calibrated for 1000 or 1500 watt peaks, it should work rather well. Palomar Engineers (1924-F West Mission Road, Escondido, California 92025) also manufactures a peak-reading wattmeter/s.w.r. bridge which works like a champ. Whatever way you choose, stay honest and conscientious. Undermodulated and below maximum limit signals are preferred over strong signals splattering obnoxiously.

Tubes, Transistors, and S.W.R.'s

The transition from vacuum-tube to solid-state r.f. amplifiers in h.f. gear has been a somewhat perplexing situation for many amateurs. On one hand there are opinions that tubes are more tolerant of high s.w.r.'s, while transistors only operate into matched loads. On the other hand transistor finals are "instant on" units which are ready for action without warm-up or tuning procedures. Whether such "compromises" are equitable to their provided benefits, however, doesn't necessarily reflect logical thinking. I'll explain my viewpoint.

Whether directed to tube or transistor final amplifiers, high s.w.r.'s indicate r.f. energy reflected back to its source (transmitter) from the load (antenna). This heat-dissipated rather than antenna-radiated power may be 20, 30, or 40 percent of a unit's available output, depending on the specific s.w.r. Although tube finals may withstand such overheating and abuse, an analog must be made to switch off a receiver to avoid detection before blatantly "loading up" an r.f. amplifier on a busy band. High s.w.r.'s don't play favorites; they affect both tube and transistor finals. Modern solid-state rigs, however, include built-in protection against careless operators.

As clarification (and in response to statements of solid-state transmitters inadequately driving linear amplifiers), I recall my own experiences with high s.w.r.'s. Several years ago I used a National transceiver to drive an untuned input kw amplifier. I didn't understand "why" at that young age, but the rig's finals wouldn't develop full output for more than a few months (the tubes ran hot, so I used whisper fans to cool them

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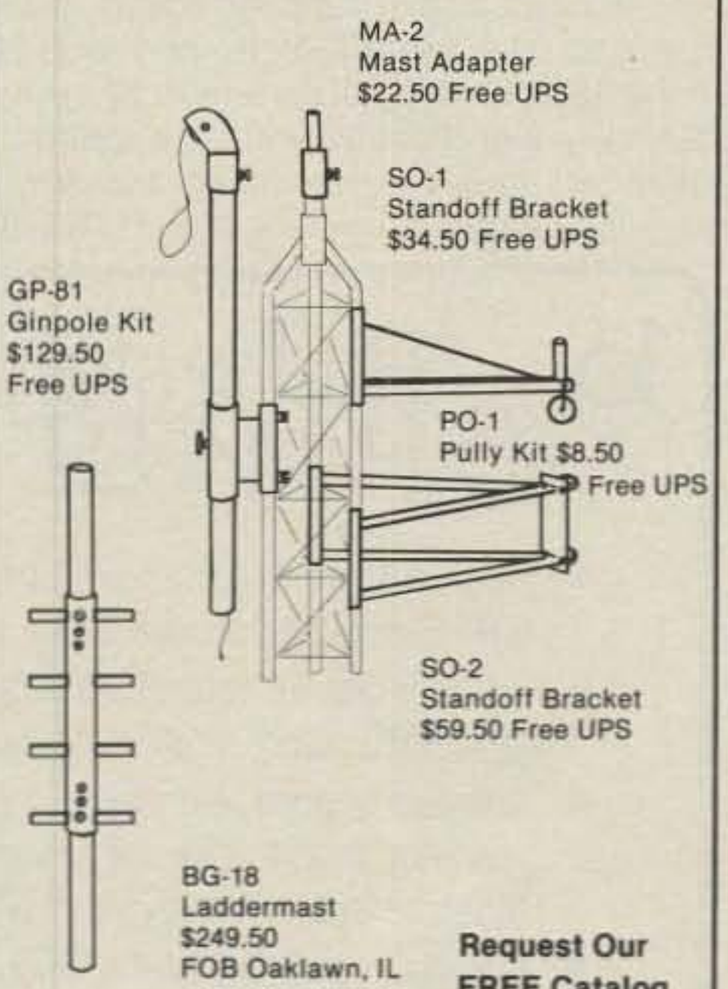

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CIRCLE 71 ON READER SERVICE CARD

and to keep my hands warm). Some years later I connected a new ICOM transceiver to the homebrew amplifier. Gad . . . 30 watts output! The culprit was found when checking power from the ICOM to the (transmit-enabled) linear: a 5:1 s.w.r.! I inserted an inexpensive MFJ tuner "between" the two, tuned it for a low s.w.r., and marked its band settings for quick use. That setup has been in use for over five years now, with both ICOM and amplifier delivering full output. If I had only known years ago.

Although most of us strive for perfect 1:1 s.w.r.'s in our setups, those results are comparatively rare in real-life situations (isn't that a reassuring thought?). Every antenna installation has its own idiosyncrasies, and each "sees" its surroundings in different ways. Nearby roofs or tree branches may be interpreted as "ground," electrically confusing the radiator and increasing reflected power. Likewise, numerous multiband antenna systems exhibit inherent s.w.r.'s regardless of "outside influences." Our alternative thus involves maintaining s.w.r. values within acceptable limits for both peace of mind and best equipment performance (not over 2:1, and preferably below 1.5 to 1).

Standing waves are produced when radio waves reflected from an antenna clash with oncoming transmitter waves, producing "lumped differences" which don't move, but appear stationary on the transmission line itself. This is illustrated in fig. 2. As with all r.f. waves, standing waves have peaks and nulls, and wavelengths corresponding to the transmitted frequency (times the velocity factor of the coax cable for technical buffs). An antenna's acceptance of supplied energy is influenced by several factors, and s.w.r.'s at the "station end" of a transmission line can vary significantly with line lengths. Likewise, impedances along transmission lines vary between high and low values according to wave peaks and nulls. Hit the right spot, and your rig is agreeable. Hit the wrong spot, and your rig panics. This is the time when antenna tuners seem attractive: they do not correct high s.w.r.'s or improve poor antenna installations, but they do match transmitter outputs to oddball impedances. The tuner rather than the station's "final" then takes the brunt of the mismatch/heat losses.

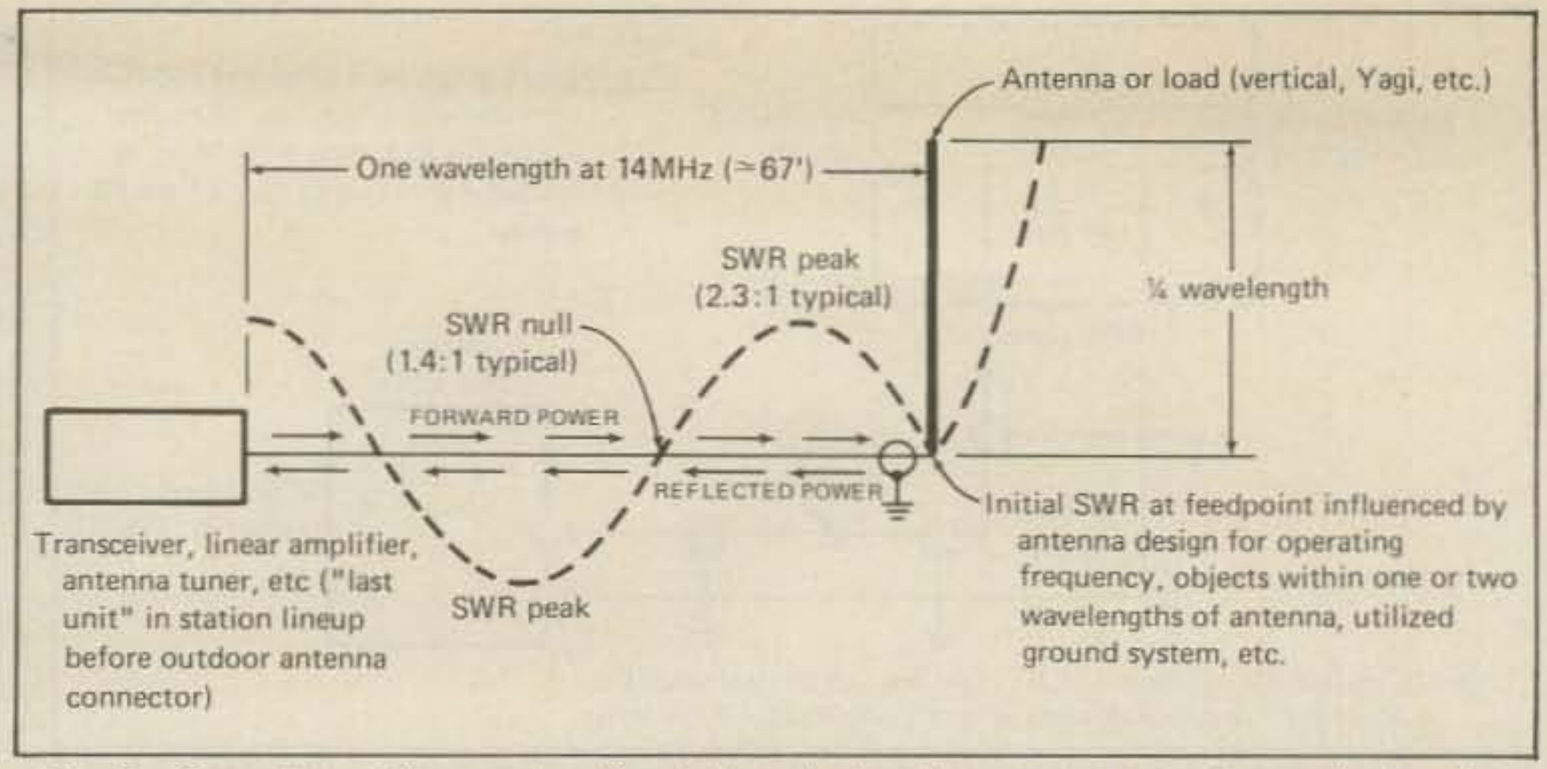

Fig. 2– Overview of forward, reflected, and standing waves on a transmission line. S.w.r. is initially established at antenna, then varies along transmission line. Antenna tuners do not lower s.w.r. along transmission line, but allow transmitter to operate into the resultant mismatch of impedance without detrimental effects.

It's interesting to note that every antenna setup stands a good chance of having its transmitter located near an s.w.r. peak rather than a null (reflected waves do not always leave an antenna at "zero degrees" of a cycle). Many good Yagis have been scrapped because of that situation. Rather than succumbing to use of high-power antenna tuners in those cases, try varying transmission cable lengths while checking s.w.r.'s (some 2 to 5 foot cables with PL259 connectors are handy here). A few checks should indicate whether you're working towards a peak or null, and you may soon find that an antenna tuner isn't necessary. As old Ben would say, a watt saved is a watt earned, right?

A Closing Thought

While writing this month's column on r.f. energy and watts, I continuously asked myself why high-power levels are considered attractive to U.S. amateurs. Most of the DX we contact uses only barefoot transceivers similar to ours, and we hear each other adequately. The attractive points from their end, however, are more equalized opportunities in (non-U.S.) pileups and easy to enjoy "basic" setups.

Wouldn't it be great if we could initiate a continent-wide QRP-day activity similar to that used on OSCAR satellites? Every Monday h.f. output powers would be mutually held to no more than 100 watts. We could all chase China with barefoot rigs, and even operate mobile with the style and class of home setups. Imagine how effectively 5 watt rigs would get out on those days . . . the reduction in QRM . . . the escalated studies of our ionosphere. Comparing 5 watts to 100 watts gives roughly a 13 dB differential; 100 watts to 1500 watts is roughly a 12 dB differential. Hmmm. Does the idea hold merit? You can answer that question for yourself by test-operating our new 30 meter band. Don't assume that 10.1 MHz spectrum isn't open if you don't hear local stations. I've called CQ in the informally designated DX window (10.100 to 10.104 MHz) and worked throughout Europe and Africa. That low-power sanctuary is just fantastic.

You know, concepts such as new operating styles and a QRP day begin as a single idea and expand one supporter at a time until they are too large to be ignored. Do we hear anyone second the motion?

73, Dave, K4TWJ

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**Options also for IC-745 listed below*

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FL-30 SSB filter (passband tuning)	59.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
SM-5 8-pin electret desk microphone	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-5 Mobile mount	19.50	
IC-720A 9-band xcvr/.1-30 MHz rcvr	$1349.00	869.95
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
SM-5 8-pin electret desk microphone	39.00	
MB-5 Mobile mount	19.50	
IC-745 9-band xcvr w/.1-30 Mhz rcvr	$999.00	789.95
PS-35 Internal power supply	160.00	144.95
CFJ-455K5 2.8 kHz wide SSB filter	4.00	
HM-12 Hand microphone	39.50	
SM-6 Desk microphone	39.00	

**See IC-740 list above for other options (*)*

IC-751 9-band xcvr/.1-30 MHz rcvr	$1399.00	1199
PS-35 Internal power supply	160.00	144.95
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	89.95
FL-53A 250 Hz CW filter (2nd IF)	96.50	89.95
FL-33 AM filter	31.50	
FL-70 2.8 Khz wide SSB filter	46.50	
HM-12 Hand microphone	39.50	
SM-6 Desk microphone	39.00	
CR-64 High stability reference xtal	56.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	19.50	

Options: 720/730/740/745/751	Regular	SALE
PS-15 20A external power supply	$149.00	134.95
EX-144 Adaptor for CF-1/PS-15	6.50	

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CF-1 Cooling fan for PS-15	45.00	
EX-310 Voice synth for 751, R-71A	39.95	
SP-3 External base station speaker	49.50	
Speaker/Phone patch - specify radio	139.00	129.95
BC-10A Memory back-up	8.50	
EX-2 Relay box with marker	34.00	
AT-100 100w 8-band automatic ant tuner	349.00	314.95
AT-500 500w 9-band automatic ant tuner	449.00	399.95
AH-1 5-band mobile antenna w/tuner	289.00	259.95
PS-30 Systems p/s w/cord, 6-pin plug	259.95	233.95
OPC Optional cord, specify 2 or 4-pin	5.50	
GC-4 World clock	99.95	94.95

HF linear amplifier	Regular	SALE
IC-2KL w/ps 160-15m solid state amp	1795.00	1299

VHF/UHF base multi-modes	Regular	SALE
IC-251A* 2m FM/SSB/CW transceiver	$749.00	499.95

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IC-551D 80 Watt 6m transceiver	$699.00	599.95
EX-106 FM option	125.00	112.95
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271H 100w 2m FM/SSB/CW xcvr	899.00	759.95
PS-35 Internal power supply	160.00	144.95
PS-15 external power supply	149.00	134.95
CF-1 Cooling fan for PS-15	45.00	
EX-144 PS-15/CF-1 fan adaptor	6.50	
AG-25 Mast mtd. GaSFET preamp	84.95	
IC-471H 75w 430-450 SSB/CW/FM xcvr	1099.00	989.95
PS-35 Internal power supply	160.00	144.95
PS-15 20A power supply	149.00	134.95
CF-1 Cooling fan for PS-15	45.00	
EX-144 PS-15/CF-1 fan adaptor	6.50	
AG-35 Mast mounted preamp	84.95	
IC-271A 25w 2m FM/SSB/CW xcvr	699.00	619.95
PS-25 Internal power supply	99.00	89.95
AG-20/EX-338 2m preamplifier	56.95	
IC-471A 25w 430-450 SSB/CW/FM xcvr	799.00	699.95
AG-1 Mast mounted 15dB preamp	89.00	
PS-25 Internal power supply	99.00	89.95

Common accessories for 271A/H and 471A/H		
SM-6 Desk microphone	39.00	
EX-310 Voice sythesizer	39.95	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM xcvr, TTP mic	549.00	489.95
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	579.95

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-22U 10w 2m FM non-digital xcvr	299.00	249.95
EX-199 Remote frequency selector	35.00	
IC-27A Compact 25w 2m FM w/TTP mic	369.00	329.95
IC-27H Compact 45w 2m FM w/TTP mic	409.00	369.95
IC-37A Compact 25w 220 FM, TTP mic	449.00	359.95
IC-47A Compact 25w 440 FM, TTP mic	469.00	419.95
UT-16/EX-388 Voice synthesizer	29.95	
IC-120 1w 1.2 GHz FM transceiver	499.00	449.95
ML-12 10w amplifier	339.00	299.95

6m portable	Regular	SALE
IC-505 3/10w 6m port. SSB/CW xcvr	$449.00	399.95
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	

Hand-held Transceivers		
Deluxe models	**Regular**	**SALE**
IC-02AT for 2m	349.00	299.95
IC-04AT for 440 MHz	379.00	339.95
Standard models	**Regular**	**SALE**
IC-2A for 2m	239.50	189.95
IC-2AT with TTP	269.50	199.95
IC-3AT 220 MHz, TTP	299.95	239.95
IC-4AT 440 MHz, TTP	299.95	239.95

Accessories for Deluxe models	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger - all batteries	69.00
BC-60 6-position gang charger, all batts	SALE 359.95
BC-16U Wall charger - BP7/BP8	10.00

Accessories for both models	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 ⅝-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord - BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-02AT Leather case for Dlx models w/BP-7/8	39.95
LC-2AT Leather case for standard models	34.95
LC-11 Vinyl case for standard models	17.95
LC-14 Vinyl case for Deluxe models w/BP-7/8	17.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 (deluxe only)	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier	SALE 79.95
ML-25 2m 2.3w in 20w out amplifier	SALE 179.95
SS-32M Commspec 32-tone encoder	29.95

Shortwave receivers	Regular	SALE
R-71A 100 Khz-30 Mhz digital receiver	$799.00	689.95
FL-32 500 Hz CW filter	59.50	
EX-310 Voice synthesizer	39.95	
RC-11 Wireless remote controller	59.95	
CR-64 High stability oscillator xtal	56.00	
R-70 100 Khz-30 Mhz digital receiver	749.00	569.95
EX-257 FM unit	38.00	
IC-7072 Transceive interface, 720A	112.50	
FL-44A SSB filter (2nd IF)	159.00	144.95
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THE INS AND OUTS OF THE WASHINGTON SCENE

FCC Reviewing Procedures for Repeater Coordination

By the time this is read, the Commission may have issued a Notice of Proposed Rule Making (NPRM) in the matter of repeater coordination. If a Notice is indeed issued, noted Ray Kowalski, Chief, Special Services Division, Private Radio Bureau, FCC, it will be the result of his division's review of the problems associated with voluntary coordination of repeaters across the country.

Among the questions his people are pondering, said Kowalski, are the following:

•How much of the interference being reported is the result of operators ignoring the "rights" of coordinated repeaters?

•Does the Commission have to institute rule-making procedures to give recognition to the coordination process?

Currently, Commission rulings regarding coordination are based on what constitutes "good amateur practice." Under this concept, coordinated repeaters have greater standing than do uncoordinated machines. There is a belief among some within the Commission, however, that if the coordination process was standardized, and if provisions were made for official recognition of the process (with coordination performed by an "umbrella organization" acceptable to the amateur community), many of the interference problems reported to the Commission involving repeaters might be resolved.

FCC Issues NPRM Regarding Allocation of Additional Frequencies to Amateurs

In October 1984, the FCC issued PR Docket No. 84-960 regarding petitions it had received on the allocation of additional frequencies to the Amateur service. The following is a band-by-band breakdown of the Commission's proposals:

30 Meters: It is proposed to designate the band 10.100–10.150 MHz for operation by all General, Advanced, or amateur Extra class licensees with A1 and F1 (including A2J) emissions. The Commission also proposes no special power limitation for this band. Further, it is proposed to make the band available for RACES operation.

17 Meters: United States government Fixed service operations in the 18.068–18.168 MHz band preclude any Amateur service usage of this band prior to 1989. Consequently, no early amateur access is proposed.

12 Meters: The FCC is proposing immediate implementation of an allocation in the band 24.890–24.990 MHz to the Amateur service and to the Amateur Satellite service (remember, the ITU recognizes *two* amateur services). Specifically, the Commission proposes to assign the band in the manner recommended by the ARRL for use of General, Advanced, and Amateur Extra class licensees. Amateur operation would be on a Secondary basis.

420–430 MHz: The NPRM notes that operations on this band in the northern part of the country have been restricted to protect certain operations in Canada. The Commission now proposes to remove this allocation *only in those portions of the country north of "Line A"* (about 75 miles south of the US-Canadian border; see General Docket No. 80-739 and Footnote NG 135 of the National Table of Allocations). Provisions are proposed under which stations now operating above line A may continue to operate.

902–928: The FCC proposes to implement allocation of this band to the Amateur service in all of the United States and its possessions except for Colorado, Wyoming, and U.S. possessions in Region 3. Amateur operation in this band would be on a Secondary basis, and the band would be available for the use of all amateur operators above the Novice class.

Comments on this proceeding are due 17 December 1984, with Reply Comments due 16 January 1985. Send your original plus five copies to: Secretary, FCC, 1919 M St. NW, Washington, DC 20554. Be sure to reference Docket PR 84-960.

Reports of R.F.I. Down Slightly From Last Year

Jeffrey Young, Chief, Field Operations Bureau (FOB), FCC, reports that during the last quarter of FY84 (July, August, September 1984) r.f.i. complaints to the Commission totaled 15,516, down from the 16,445 complaints received during the same period last year.

Of the 15,516 complaints received, only 10,672 involved a television receiver as the victim device. CBers are alleged to have been responsible for 5,856 of the t.v.i. cases reported, while amateurs were cited in 636 of the t.v.i. complaints. In all, complaints involving CBers totaled 6,992, down significantly from the 9,857 cases reported in the last quarter of FY82. That the number of CB-related r.f.i. cases has dropped is due, probably, to the continued decline in CB use across the country. Amateurs accounted for 909 of all complaints filed in the quarter.

As in the past, the number of complaints by amateurs against other amateurs remained high, with 232 reports filed with the Commission. Such complaints are a continued source of concern to the Field Operations Bureau as well as to the Private Radio Bureau (see above).

Also of interest is the observation that interference resulting from the incidental radiation produced by so-called "Part 15" devices was cited in 1400 r.f.i. complaints during the reported period. This category of r.f.i. is also being watched closely by the FOB.

Finally, the total number of r.f.i. complaints reported during FY84 was 67,760, about the same as the 67,803 complaints filed in FY83. Thus, with the numbers running nearly 70,000 per year, there still appears to be a need for the Commission to set susceptibility standards for electronic home-entertainment equipment.

Interference Bills Under Consideration In Both House and Senate

In an earlier column we reviewed bill S 2975, which was introduced into the Senate by Barry Goldwater (R-AZ) to make willful or malicious interference to communications a statutory offense. A

Quote of the Month:
"Encourage your DX-contester friends to play DOCTOR DX on their computers and help decongest the airwaves."
Paul L. Rinaldo, W4RI
Editor, *QEX*

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Say You Saw It In CQ

similar bill, introduced shortly before Goldwater's by Representative Jim Bates (D-CA), had been under consideration by the House of Representatives during the last session of Congress. The latter, H.R. 6195, would have added a new section to the Communications Act—Section 302A—that would address those persons who deliberately interfere with radio communications. The Bates Bill would also have amended Section 510(a), and would have authorized the forfeiture of equipment for the willful violation of Section 302A. Goldwater's bill, too, called for equipment seizure where there was reasonable belief that such seizure was required to prevent continued interference to other communications. Neither bill applied to the problem of radio-frequency interference (r.f.i.). One concern that had been addressed by the Congress, the Commission, and the ARRL was that the bills may not have contained enough safeguards for the accused. Discussions on this issue resulted in the legislation being changed to permit seizure only on Commission complaint of criminal violation.

Both bills will have to be reintroduced in the new session of Congress.

Legislation on Private Reception Of Satellite Programs Awaits President's Signature

As we go to press, legislation is on the President's desk that would legalize the reception of satellite cable programming for private viewing. Hidden in the back of legislation known as the "Cable Telecommunications Act," the provisions of the bill would permit individuals to use small Earth terminals for the reception of programming from satellites in the geostationary orbit providing:

1. The programming involved is not encrypted;

2. The operators who supply such programming have not instituted procedures under which an individual may acquire programming using a private Earth terminal.

With respect to the second point, note that if an individual installs and legally uses an Earth terminal under the conditions of the legislation, and that if, at a later date, the operator supplying programming via satellite establishes an agent in the area for the purpose of marketing this programming to the public (who, in turn, will used a private Earth terminal to receive the programming), the individual will have to obtain authorization to use the service from the agent. Note that no provisions are made for "grandfathering" existing installations, and that substantial penalties are imposed for violating the provisions of the bill.

The legislation also imposes substantial penalties for importing, manufacturing, selling, or distributing equipment that can be used to receive encrypted signals ("decoders").

Full details of the Cable Telecommunications Act and the provisions of the Act as they pertain to the use of private Earth terminals may refer to the Congressional Record—Senate, p. S 14281, 11 October 1984.

Weather Network Using Computers and Packet Radio Proposed

Two highly respected educators—Dr. Noel Petit, WB0VGI, of Augsburg College in Minneapolis, and Dr. Fred Decker, W7ANX, Principal Deputy Assistant Secretary, U.S. Department of Education—have proposed the development of a computer-based meteorology network that would use packet-radio communications to exchange information.

Speaking at the workshop on "Meteorology as a Unifying Educational Strategy for Improving Science, Mathematics, and Technology Education in the Nation's Schools," in Arlington, VA, Dr. Petit (together with Dr. Homer Mantis) proposed the development of computer-based weather stations that, including the computer, sensors, and modem, could be built for about $300. Though Dr. Petit had originally envisioned that the weather stations would communicate with a central site by means of the telephone, it was Dr. Decker who proposed to involve radio amateurs in the project, and to use packet-radio networks on the 220 MHz band to gather data.

If you are interested in working on the development of an amateur radio weather network employing packet-radio techniques in the 220 MHz band, contact Dr. Noel Petit, Suite 220-B, 511 11th Avenue S., Minneapolis, MN 55415, telephone (612) 338-6589.

League Introduces Newsletter For Packet Radio

Late last year the ARRL introduced a newsletter dedicated to amateur packet radio. Known as *Gateway*, the newsletter is a nontechnical, biweekly publication intended to update readers on the latest "happenings" in areas such as club and association activities, packet meteor scatter, protocols, and the development of packet-radio bulletin boards.

Additional information on *Gateway*, including subscription rates, is available from the ARRL, 225 Main Street, Newington, CT 06111.

Amateurs Use Packet Radio For Routine Meteor-Burst Contacts

As reported in *QEX*, the ARRL's "experimenter exchange," amateurs are making routine contacts on 6 meters using packet-radio techniques and meteor-burst propagation. According to Robert Carpenter, W3OTC, of Rockville, MD, he and Ralph Wallio, W0RPK, of Indianola, IA, have enjoyed error-free contacts using nothing more than Tucson Amateur Packet Radio (TAPR) boards, computer terminals, and conventional amateur equipment. Currently, FM-AFSK modulation is used for meteor-burst communications, although work is now underway to investigate the feasibility of using PSK techniques and higher power. In addition, Carpenter, Wallio, and others are developing a protocol better suited to the characteristics of meteor-burst propagation. Anticipating the improvements they hope to obtain, Carpenter notes that "an expected 6 meter data rate of 7.5 to 24 bps is not bad for 100% perfect copy at a distance of 1300 km on a 'dead' band."

Ham Takes A.M. Power Reduction Issue to U.S. Court of Appeals

Glenn Baxter, K1MAN, a registered Professional Engineer, has taken Docket 82-624 regarding a.m. power reduction in the year 1990 to the U.S. Court of Appeals in Washington, D.C. This action follows on the heals of the FCC's rejection of three petitions seeking a reversal of the ruling on a.m. power reduction. The U.S. Court of Appeals, a panel of three judges, is one step below the U.S. Supreme Court.

In taking the action Baxter said that "... it is the principle of the thing that is important ... Believe it or not, the primary reason given by the FCC for not allowing one full kw of a.m. is the extra expense and training involved when compared to measuring the allowable 1500 PEP output for s.s.b."

Amateurs Among Those Honored By The Radio Club of America

The Radio Club of America, the world's first radio communications society, recently honored 31 of its members by elevating them to the status of "Fellow." Among those honored were many radio amateurs, demonstrating once again that a career in communications/electronics is closely tied to work in the Amateur and Amateur-Satellite services. Those honored include Taizo Arakawa, N2ATT, JA3AER; Frank Borsody, K4EC; Edward Braddock, W1XV; Robert Brandel, WA0UHS; Anthony Clement, W6KPC; Ivan Coggeshall, KA1AVG; William Donaldson, K2YOI; Archibald Doty, K8CFU; William Gary, K8SCG; Gerald Goldberger, W9LMF; Homer Huddleston, W5TLW; Luther Pully, W5JIZ; John Ryder, K4IHX; George Schleicher, W9NLT; Thomas Stevens, W5VCJ; and Edward Weingart, WA2DFM. The staff of *CQ* joins your Washington editor in extending congratulations to these amateurs for their fine achievement.

Your Washington Editor thanks Mr. Richard Smith, Chief, Field Operations Bureau, FCC, for his contributions to this month's column.

Antennas

a monthly feature by
KARL T. THURBER, JR., W8FX

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

Product Peek—Part III

Last month in CQ columnist Thurber examined several antenna-related product offerings. This month he takes a look at several additional antenna products and introduces some new topics as well.

In last month's column we examined the product lines of several different manufacturers. We looked at the Jaybeams, the DJ2UT multiband trapless beams, and W9INN's no-trap dipoles and sloppers. We also slit open the mailbag to take care of some reader mail, and we highlighted some ham computer software.

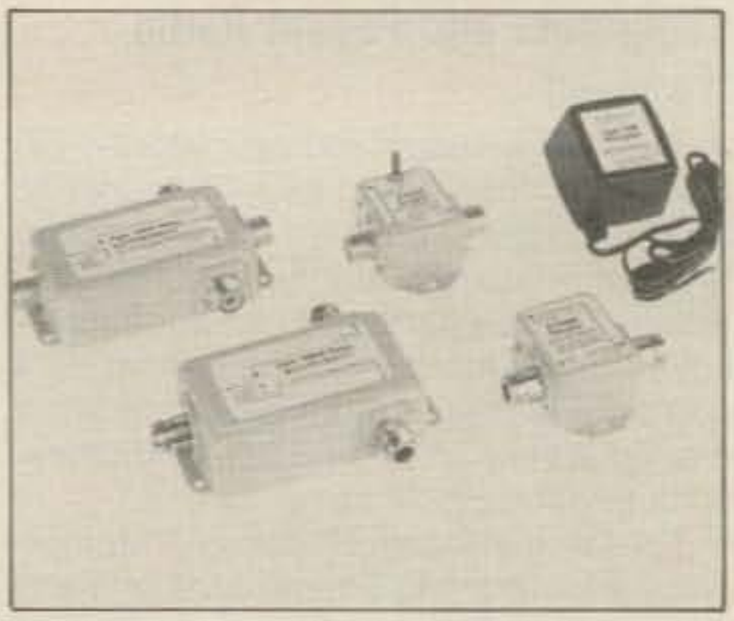
This month we'll peruse several antenna firms' product lines with Part III of the "Product Peek" series. We'll survey those products offered by Unadilla/Reyco/Inline, Grove Enterprises, RF Products, and Butternut Electronics. We'll also feature some innovative and unusual antenna designs submitted by W0MBP and look at some other reader mail. Finally, we'll take a look at our software notepad. Let's peek into some product lines first.

Product Peek

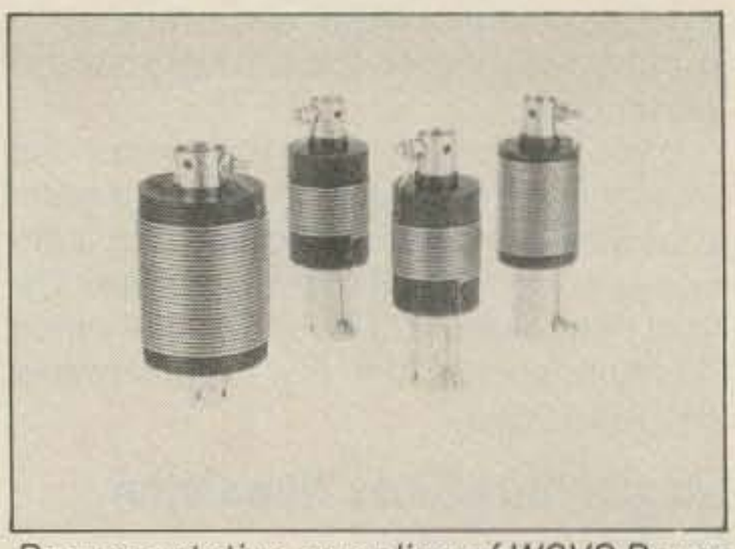
Unadilla/Reyco/Inline. "Extensive" is probably the best way to describe the antenna and antenna-accessory product lines of Unadilla/Reyco/Inline (6743 Kinne St., East Syracuse, NY 13057). Operating on the very reasonable theory that a dime on the antenna is worth a dollar on the radio, the firm specializes in "antenna accessories for personal communications," as one of their catalogs indicates. The products offered include various antenna baluns (W2AU and W2DU); W2VS-Reyco h.f. antenna traps and trap antenna kits; inline coaxial relays; low- and high-pass filters; dipole center and end insulators; and related parts and hardware.

The history behind these products is interesting, and some are named after the developers' callsigns. The W2AU balun, for example, has become something of a classic over the years. This balun was first developed by Paul Wandelt, W2AU, over 20 years ago. The new "no transformer" W2DU models, which are known as Maxi-Baluns, are, in effect, short coaxial-line extensions of the main feedline, surrounded by high permeability ferrite beads. The beads insert a high impedance in series with the outer surface of the coaxial shield conductor, providing external isolation between the output and input terminals of the shield conductor, thereby blocking current flow in its outer surface. Current flowing upward on the inner surface of the shield is thus prevented from flowing around the end of the coax and onto the outer surface of the shield at the antenna-feedline junction; the current can flow only onto the dipole half that is connected to the shield. Since equal current for the opposite dipole half flows from the center conductor of the coax, the result is a balanced output from an unbalanced input.

317 Poplar Drive, Millbrook, AL 36054



Shown here are some of the relay components and accessories offered by Unadilla/Reyco/Inline. Very complex switching schemes are made possible using various combinations of "wired" and "wireless" relays. The latter type of relay is unusual in that the activating relay voltage arrives on the coax line by means of a special coupler device. Unadilla's Catalog #IN/84 contains a wealth of switching hookup ideas.



Representative sampling of W2VS Reyco Antenna Traps. Some seven different traps are available, providing over 200 different operating combinations from 10 through 160 meters. (Photo courtesy Unadilla/Reyco/Inline)

W2DU-VHF balun provides a 1:1 impedance transformation and is designed to operate with high efficiency from 6 meters through 300 MHz. It is intended to eliminate the need for a "rod and tube" hardware balun at these frequencies. (Photo courtesy Unadilla/Reyco/Inline)

The W2VS trap antenna coils were developed by Fred Reynolds, W2VS, over 18 years ago, and they are in wide use around the world in both amateur and commercial applications. For example, the traps are used with the multiband h.f. communications transceivers of a number of pipeline companies and others who must coordinate far-flung, multiple-site operations.

The inline coaxial relays had their start some 23 years ago, in 1961, when Sam Lackoff, W1NBB, designed and built custom coaxial relays to eliminate multiple cable runs on his antenna farm in Manchester, New Hampshire. Encouraged by requests from other hams for devices similar to those he used, he went into production and over the years created a whole system of relays which can be used to remotely select from up to nine antennas and perform other useful switching chores to minimize tower-climbing. Unadilla's remote-switching coaxial relay systems have a nomencla-

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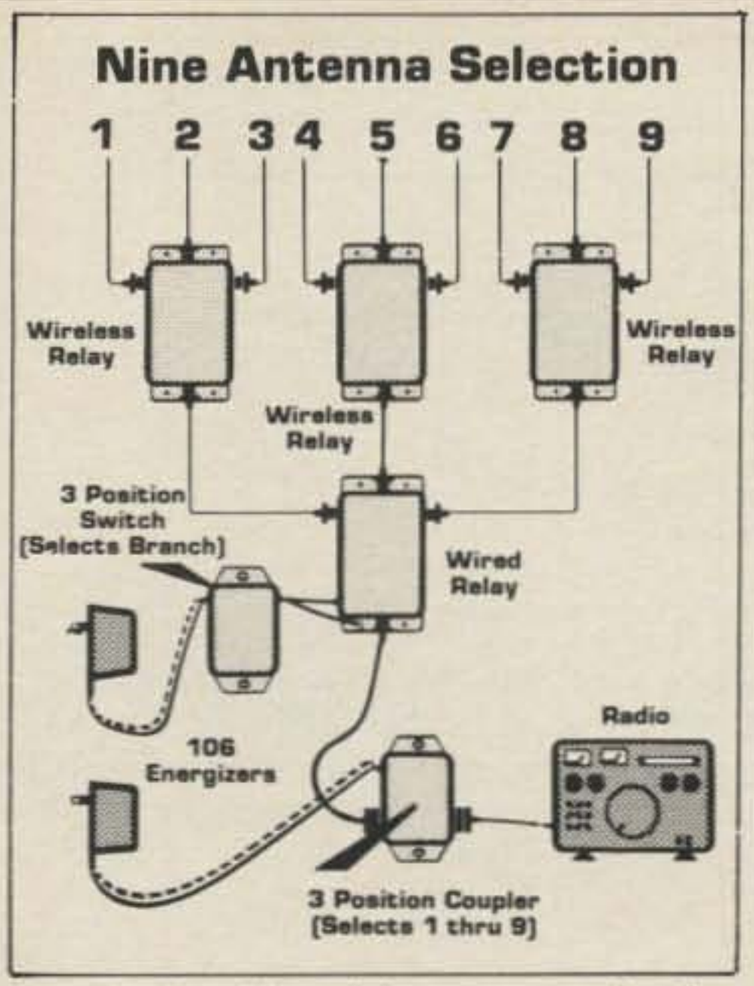

Fig. 1– Unadilla mini antenna selection system.

ture all their own and are made up of individual devices known variously as "wired" and "wireless" relays; energizers and energizer switches: and activating voltage couplers.

Fig. 1 shows a typical remote switching hookup to accommodate up to nine antennas; as can be seen, the hookups used to switch more than just a few antennas are quite complex. A note or call to the company should bring a copy of catalog IN/84, which constitutes a minitutorial on antenna switching, featuring example hookups galore. Another catalog well worth obtaining is PC-84, which features amateur antenna accessories and traps.

Grove Enterprises. Bob Grove, WA4PYQ, is a ham, although the thrust of most of his products is directed at "radio monitoring enthusiasts." But since amateurs are just that and then some, many of his products are useful to amateurs from the "reception standpoint." Bob's firm, Grove Enterprises, Inc. (P.O. Box 98, Brasstown, NC 28902), publishes an interesting catalog that features a wide selection of h.f. receivers; scanner monitors and frequency adapters; h.f./v.h.f./u.h.f. receiving antenna tuners and preamplifiers; and various h.f. and v.h.f./u.h.f. receiving antennas, both passive and active. Bob also publishes *Monitoring Times*, a monthly tabloid newspaper for serious listeners, DXers, and scanner monitoring enthusiasts.

A side note: Bob is an excellent and entertaining speaker, and his presentations to various hamfest groups on unusual monitoring "catches" are very interesting and leavened with a dash of intrigue. His talks on subjects such as "freaky frequencies outside the ham bands" have become perennial favorites at the Atlanta HamFestival, for one example. Keep up the good work, Bob!

Porta-Tennas. These telescopic, v.h.f./u.h.f. ⅝-wavelength portable antennas are available for the 144–174, 220–225, and 440–512 MHz bands and are intended to be used on either fixed station or portable transceivers. The Porta-Tennas are offered by RF Products (P. O. Box 33, Rockledge, FL 32955).

The whips are made of chrome-plated brass and are set up so as to use relatively few sections to maintain light weight and few r.f. junctions. A slow s.w.r. is achieved through use of an adjustable LC network. The inductor coil is also used as a spring to prevent damage to the telescopic whip. A large number of combinations of connector types and frequency bands are offered by RF Products; I counted some 20 different combinations in a recent flyer. Also offered is a line of telescopic v.h.f. quarter-wavelength antennas for 140–174 and 220–225 MHz for use on either portable or fixed station transceivers and test equipment, such as frequency counters and field-strength meters. RF Products' current catalog also shows many other mobile and portable antennas and accessories.

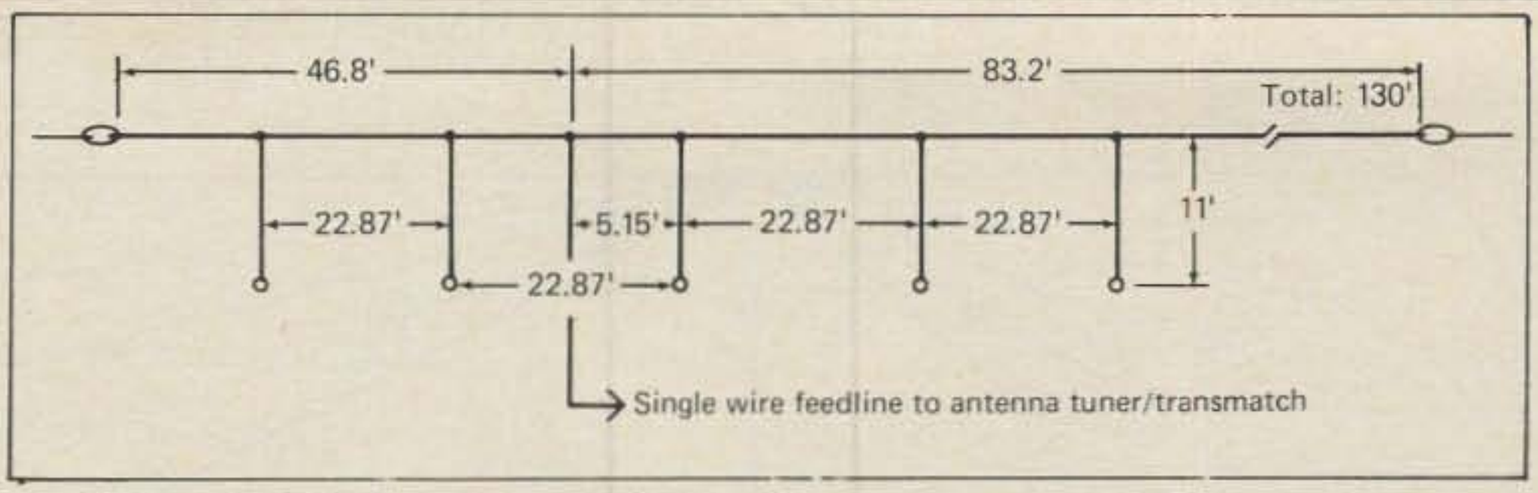

Fig. 2– WØMBP 130 foot six-band windom (diagram not to scale). Diagram shows how 30 and 15 meters may be added to a common 130 foot Windom. WØMBP has tested the antenna on 15, feeding it with a single-wire line to the hamshack, and has found it to be a good performer. Note the 11 foot vertical sections which are spaced 22.87 feet from one another.

Butternut Verticals. Butternut Electronics Co. (405 E. Market Street, Lockhart, TX 78644) has as its "mainstay" products high-quality verticals for h.f. and v.h.f. operation. The HF6V is a 26 foot vertical for 10–80 meter (including 30 meter WARC) operation that features low s.w.r. and good bandwidth. The 2MCV Trombone™ is a long (9.8 foot) collinear gain design for 2 meters that boasts excellent decoupling of the radiator from its supporting mast and feedline. An even longer model, the 15.75 foot 2MCV-5 Super Trombone™ is also available; the tall 5-element radiator is of rugged construction and is unbroken by insulators. The latter antenna has a claimed gain of 5 dB over a quarter-wave vertical.

In an update from Don Newcomb, WØDN, of Butternut we find that on the horizon are 2MCV and 2MCV-5 designs scaled for both 220 and 440 MHz, and for the latter band a possible "three trombone" model. A scanner monitor antenna based on the successful trombone de-

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200 VA	140 W	117V	.23	4.2 × 2.0"	3.3	601.020	$38.00	$32.00	$28.00
400 VA	260 W	117V	.44	4.7 × 2.5"	5.5	601.040	$54.00	$46.00	$41.00
700 VA	460 W	2 × 117V	.44	5.8 × 2.8"	8.5	602.070	$72.00	$62.00	$55.00
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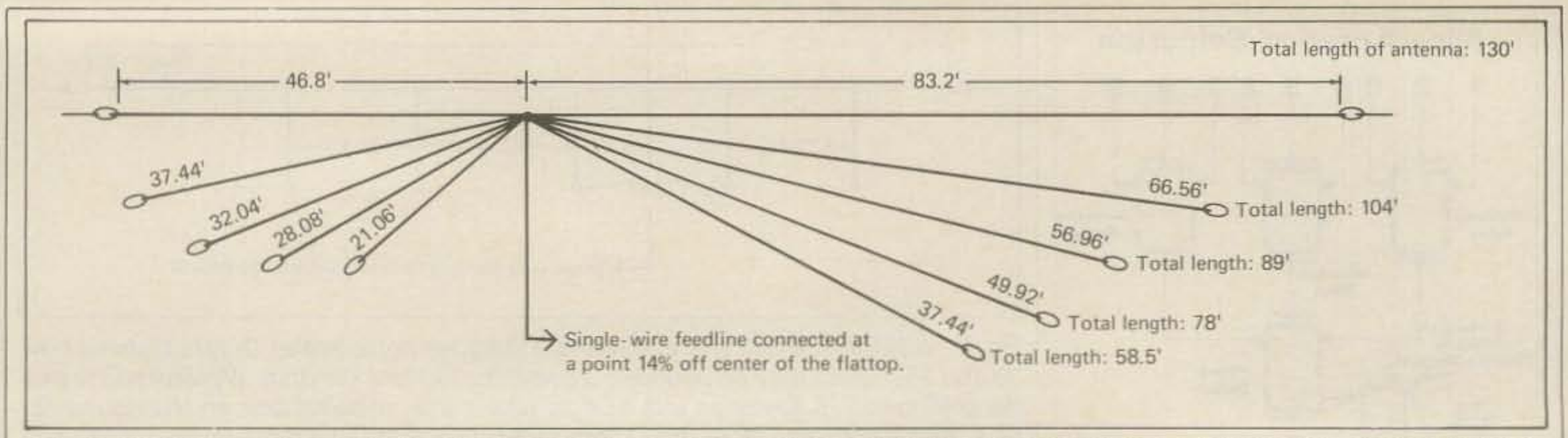

Fig. 3– WØMBP paralleled Windom (drawing not to scale). This 130 foot Windom is designed for coverage of a wide variety of h.f. frequency bands. Fed 14% off-center as with conventional Windoms, the overall construction resembles that of the popular "paralleled dipole" to achieve multiple resonance. Due to the many resonance combinations that are possible with this antenna, you should consider the design as "experimental." While experimenting, consider substituting open-wire line or twinlead for the single-wire feed that WØMBP used.

sign is also in the works. On the "back burner" at this writing is a 2-element, tri-band-plus-WARC mini-beam that features a 6 foot boom and uses no traps or loading coils. According to Don, when it comes to market it will probably be offered as a basic 3-band model with optional add-on units for 18 and 24 MHz. Several of these models, which were in the development stage as of this writing, may be available by the time this column reaches you.

Reader Mail De WØMBP and KA9KUH

A couple of months ago in the column we featured a rather unusual "hybrid" experimental antenna submitted to us by Cliff Francis, WØMBP. This design was called, for short, the "WØMBP ABBBC Field Day Antenna," or more formally, the "WØMBP Ambidextrous Bobtailed Bi-Directional Broadside Curtain."

Despite the tongue-in-cheek naming of this rather serious Field Day skyhook, in subsequent correspondence with Cliff we find that he is a determined backyard antenna tinkerer in the finest amateur tradition. His specialty lies in designing broadside curtains and Windoms and various combinations thereof. Cliff sent us a rather large packet of experimental designs along these lines, which contained over 50 antenna designs, both tested and untested, some of which were quite novel and even controversial, and others of which were good enough to be submitted to technically oriented publications such as *Ham Radio* and *QEX*.

Cliff is highly enthusiastic about the possibilities for experimentally combining the broadside curtain and Windom, and he asserts that these two antenna types can be combined in a wide variety of ways to fit various height/length and band combinations, as indicated by the complexity of several of the designs he submitted. Cliff has "stock" designs for many applications, including even an unusual "Windom-Quad." The latter design uses 1.28-wavelength loops instead of the normal 1-wavelength loops, and it is fed with 600 ohm line.

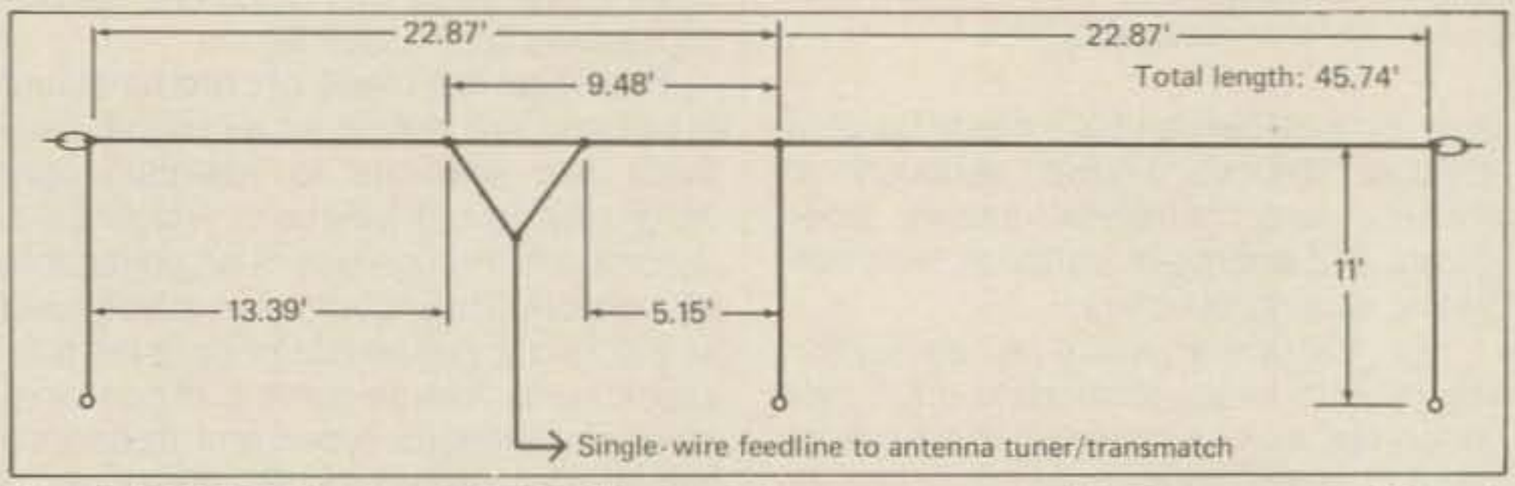

Fig. 4– WØMBP five-band BBBC Windom (diagram not to scale). Space-saving 5-band Windom for 40, 30, 20, 15, and 10 meters is shown above. Note the single-wire feedline which is "fanned" at the point of connection to the 45.74 foot flattop. Each leg of the "delta" formed by the fan is 4.33 feet. Each vertical section is 11 feet in length.

Louro, or "Blondie," the Papagaio speech synthesizer described in this month's column, talking up a DX storm. Louro is owned by Mac, PY1QQ. (Photo courtesy PY1QQ via KA9KUH)

Of the many proposed antenna designs which Cliff sent us, we would like to share with you three of the simpler, easier-to-construct ones. Fig. 2 shows what's needed to add the 15 and 30 meter bands to an ordinary 130 foot Windom, which would otherwise be limited to 80, 40, 20, and 10 meter operation. Fig. 3 shows an antenna that combines the Windom and "paralleled dipole" approach for "16-band" operation. This design could be of specific interest to MARS members and s.w.l.'s because of the antenna's multiple resonance. According to WØMBP, frequency bands covered are 3.6, 4.5, 5.25, 6, 7.2, 8, 9, 10.5, 12, 14.4, 16, 18, 21, 24, 28.8, and 32 MHz. Fig. 4 shows a 45.74 foot BBBC Windom for 40, 30, 20, 15, and 10 meter operation. Cliff recommends starting off with flattop dimensions between the vertical elements of the BBBC cut a few percent long, pruning the vertical elements with this additional length built in.

Those interested in exchanging notes on experiments with these designs may wish to contact WØMBP at 325 S. 3rd St., Silsbee, TX 77656. Happy tinkering!

We've written up some of Harv Nelson, KA9KUH/PY1ZFF's amateur radio software in previous columns and have corresponded off and on over the past six to eight months. Harv sent us this rather cute, tongue-in-cheek story that we would like to share, even if the story is not all that closely related to the "antenna theme" of the column.

Seems that Harv is a c.w. op, and during a recent visit to a 'phone station, he was surprised to hear a computer-controlled speech synthesizer working on 40

Say You Saw It In CQ

s.s.b. This brought to mind an experience he had while visiting in Brazil last year, where he had the opportunity to work with a "Papagaio Synthesizer" as used by Mac, PY1QQ. Mac has used this particular synthesizer for years as an aid to contest operation, even for several years before the "newfangled" electronic models were available.

The Papagaio unit works quite well, and no speech processor is necessary, since the audio produced is already "compressed." Even so, fidelity is excellent, and speech from the unit is often more intelligible than many human voices, especially after several hours of fever-pitch contest operation.

Programming the unit does require some time and patience, since loading new programming into the Papagaio's CPU (central processing unit) can be difficult. Sometimes, in fact, the Papagaio "runs off at the mouth," relying on old programs that have not been removed completely from its memory. But, with patience, Mac finds that the desired language can be "POKED" into memory. Developing a full complement of contest-QSO synthesized sequences required about two hours of work each day over a period of four weeks. Fortunately, no machine language is necessary, just a version of plain old BASIC language.

Mac gives one word of caution when programming the Papagaio, and this one struck home with me: Don't have the unit present at antenna-raising parties! Due to some anomaly, the unit seems to have a great facility for acquiring all the expletives necessary to erect 60 foot towers topped by 40 foot monobanders! This vocabulary, while useful for relieving pent-up frustrations, is, of course, not acceptable for transmission over the air. And, as already mentioned, deprogramming the Papagaio can be difficult.

According to information passed along by KA9KUH, the unit has been successful in working several DXpeditions and in last year's *CQ* WPX Contest. The Papagaio held its ground in competition with the best stations and with other synthesizers. Best of all, annual maintenance amounts to about $10 (U.S. funds) a year—chicken-feed indeed when compared with comparable solid-state systems. Thus, for any amateur who wants to invest in a speech synthesizer, Papagaio can present a useful and reliable alternative, and it certainly has more personality than a little "black box."

Papagaio, of course, means "parrot" in Portuguese! In Brazil the word is also used by amateurs to refer to the amateur who "runs off at the mouth," and who never gives anyone else a chance to talk. Our thanks to Harv Nelson, KA9KUH/PY1ZFF, for this entertaining story.

Software Notes

In the past we have mentioned sources of satellite tracking and related scientific software, including the offerings of David Eagle. Dave offers a variety of general scientific, satellite, model rocketry, and even hot-air balloon performance programs for the Vic-20 and Radio Shack PC-2 computers.

The BASIC-language astronomy series includes a LUNAR program which determines the position and phase of the moon, and which compensates for the flattening or "oblateness" of the earth and the observer's location. The five-program satellite series allows the user to determine the location of TVRO, weather, OSCAR, and other earth satellites for radio tracking and visual observation. All programs are furnished with complete program listings and a comprehensive user's manual; versions for the Vic-20 and PC-2 also include a cassette tape.

Dave passes along his new address, which went along with a move from Pennsylvania. It's now Eagle Software, 7952 W. Quarto Drive, Littleton, CO 80123.

Bill Giel, KD1O (524 Valley Ave., Yonkers, NY 10703) has put together a fairly comprehensive but inexpensive collection of nine contest-oriented amateur

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                       CONTEST LOG

CALL USED- KD1O/2                                    SECTION- ENY

LICENSE CLASS- EXTRA
SINGLE-OPERATOR

( 41  QSO'S + CP CREDIT 30  ) X ( 27  SECTIONS + COUNTRIES 0  ) =

 1917  CLAIMED SCORE                  HOURS OF OPERATION- 09:17:09

TRANSMITTER- KENWOOD TS52OSE                  INPUT POWER- 18O WATTS
RECEIVER- SAME                                ANTENNAS- TRAP DIPOLE

I have observed all competition rules as well as regulations established for
amateur radio in my country.My report is correct and true to the best of my
knowledge.I agree to be bound by the decisions of the ARRL Awards Committe.

Date_____Signed_____Call_____


                    MULTIPLIER CHECK-OFF LIST
1     2     3     4     5     6     7     8     9     0     VE
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NH*   SNJ   WPA*  NC    NM    SBER  NV                MN    MAN
RI*   WNY*       NFL*  NTX   SCV   OR                MO    SAS
VT*               SC*   OK    SDCO  UT                NB*   ALB
WMA               SFL*  STX*  SF    WA                ND    BC
                  TN*         SJV   WY                SD*   NWT
                  VA          SV    KL7
                  W.I.*       PAC

* Denotes sections worked


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Fig. 5– KD1O HAMPAK "ROUNDUP" program printout.

programs for the Commodore 64, which he calls the "HAMPAK."

The programs included in the package are CONDX, an MUF (maximum usable frequency)/FOT (frequency of optimum traffic) calculation around which most of the programs in the package revolve; LOGPRINT, used to produce a formatted hardcopy of the log produced by the HAMLOG program; CARDPRINT, a QSL label printer, suitable for use with the QSO data files created with HAMLOG; and RADIOSPORT, designed to be used in conjunction with the QSO data file created with HAMLOG, during the IARU Radiosport contest.

Also included in the package are ROUNDUP, used to score the QSO data file compiled with HAMLOG during the Novice Roundup contest; SWEEPLOG, a specialized logging program to be used during the ARRL November Sweepstakes; SWEEPSCORE, to be used in connection with the SWEEPLOG QSO data file for scoresheet printing; and FILE-EDITOR, which allows you to view and edit the HAMLOG QSO data file before further processing.

The HAMPAK package is offered on tape or disk for $25.00 postpaid direct from KD1O, and it includes a very comprehensive, neatly bound, 50-page user's manual—something of a rarity in the frequently poorly documented world of ham-shack software! Fig. 5 shows an example scoresheet printout generated by the ROUNDUP program.

Apple computer owners, awaken! Long-time amateur and computer-article author and experimenter Bill Smith, K3LF, has come up with an Antenna Design Software package for use on either the Apple II + or IIe computer equipped with a single disk drive.

The package is a menu-driven system consisting of 26 program modules that can help you with the design and tuning of your antennas and transmission lines. Each program module is designed with the Novice amateur and computer buff in mind, but is also valuable to the experienced user, as it solves complicated design problems without the use of nomographs, charts, tables, and calculators.

The programs in the package are arranged into six main categories, and all of the 26 specific programs are accessible through the main and various sub-menus. The six categories include antenna design and dimensions; transmission lines; standing-wave ratio; propagation; component design and dimensions; and miscellaneous. The format chosen allows you to solve up to eight problems and

```
   3 ELEMENT QUBICAL QUAD DIMENSIONS

NOTE: USE THIS SECTION TO CALCULATE THE
      ELEMENT WIRE LENGTH (CIRCUMFRANCE)
      AND SPACING BETWEEN ELEMENTS

FREQ.  DRIVEN    REFLECT   DIRECTOR SPACING
       ELEMENT   ELEMENT   ELEMENT
(MHZ)  (FT:IN)   (FT:IN)   (FT:IN)   (FT:IN)
-------------------------------------------
145    6:11.2    7:1.2     6:8.7     Ø:9.8
146    6:1Ø.6    7:.7      6:8.1     Ø:9.8
147    6:1Ø      7:.1      6:7.6     Ø:9.7
148    6:9.5     6:11.5    6:7.1     Ø:9.6
21.2   47:4.9    48:7      45:11.9   5:7.4
21.25  47:3.5    48:5.6    45:1Ø.6   5:7.2
21.3   47:2.2    48:4.3    45:9.3    5:7
21.35  47:.9     48:2.9    45:8      5:6.9
///

        ENTER '///' TO EXIT
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```
   3 ELEMENT QUBICAL QUAD DIMENSIONS

NOTE: USE THIS SECTION TO CALCULATE THE
      LENGTH OF EACH SPIDER ARM & BOOM

FREQ.  DRIVEN    REFLECT   DIRECTOR  BOOM
       ELEMENT   ELEMENT   LENGTH    LENGTH
(MHZ)  (FT:IN)   (FT:IN)   (FT:IN)   (FT:IN)
-------------------------------------------
145    1:2.7     1:3.1     1:2.3     1:7.7
146    1:2.6     1:3       1:2.2     1:7.6
147    1:2.5     1:2.9     1:2.1     1:7.4
148    1:2.4     1:2.8     1:2       1:7.3
21.2   8:4.6     8:7.1     8:1.6     11:2.7
21.25  8:4.3     8:6.8     8:1.3     11:2.4
21.3   8:4.1     8:6.6     8:1.1     11:2.1
///

        ENTER '///' TO EXIT
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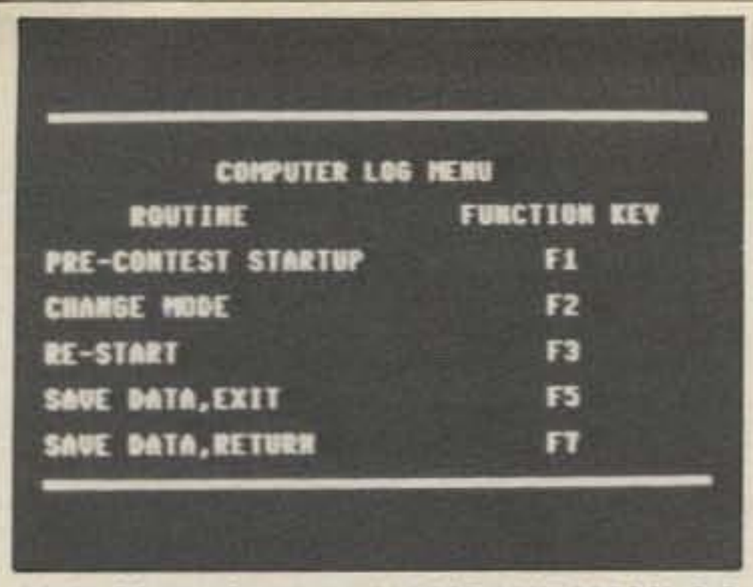
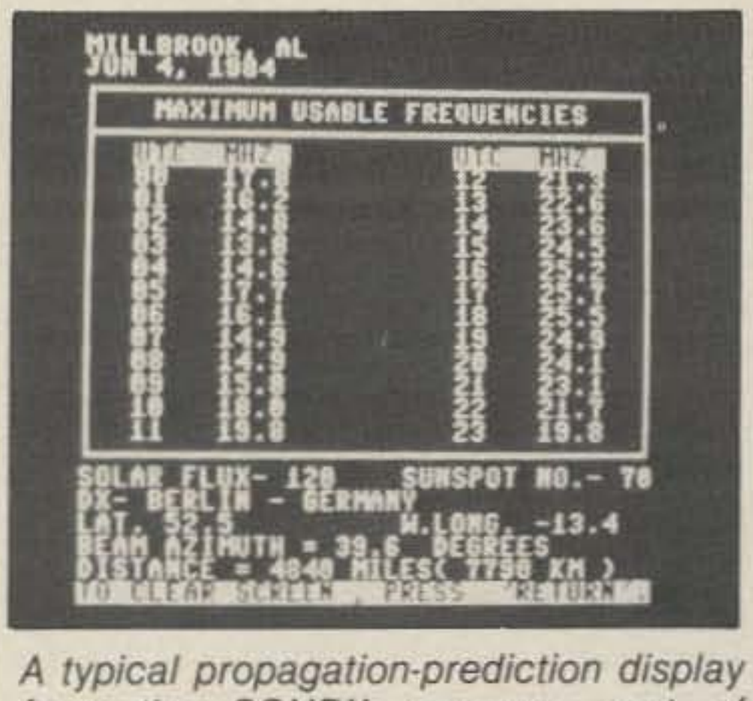
Fig. 6– K3LF antenna design program printout. Example at left shows the element wire length and spacing between elements. Note that eight "cases" are displayed. Example at right shows the length of each spider arm and boom. In this example seven "cases" are shown.



Main Menu for the "HAMPAK" HAMLOG logging package by Bill Giel, KD1O. The various routines performed by the program are accessed from this menu by depressing the various function keys. The program is particularly oriented to contest logging applications. (W8FX photo)



A typical propagation-prediction display from the CONDX program, part of KD1O's "HAMPAK" contest-oriented software for the Commodore 64. While a discrete path between Alabama and Germany is shown here, the program can also produce a worldwide prediction sheet for nine major areas of the world. (W8FX photo)

have the results displayed on the screen for comparison and "what if" analysis.

A few of the things K3LF's Antenna Design Software package can do are calculate dimensions for various antenna types, such as dipoles, quads, parabolic dishes, and verticals; determine folded dipole impedances; provide transmission-line length and various loss factors; calculate coaxial and parallel-line impedance given the line's physical dimensions; make several s.w.r.-related power, voltage, and impedance calculations; determine phased vertical radiation patterns; calculate great-circle bearing and distance; determine radio line of sight; help calculate component values for parallel resonant circuits; and make dB-to-power and dB-to-voltage conversions.

A handy feature includes a "guy-wire calculating program" which takes care of the trigonometry involved in determining guy-wire length for a given tower height and ground distance. Another nice feature is the TVI frequency calculator which allows you (1) to input a given TV channel number to display the audio and video carrier frequencies associated with that TV channel; and (2) to input a frequency where interference is occurring and then list some 30 harmonic frequencies and their associated fundamental frequencies.

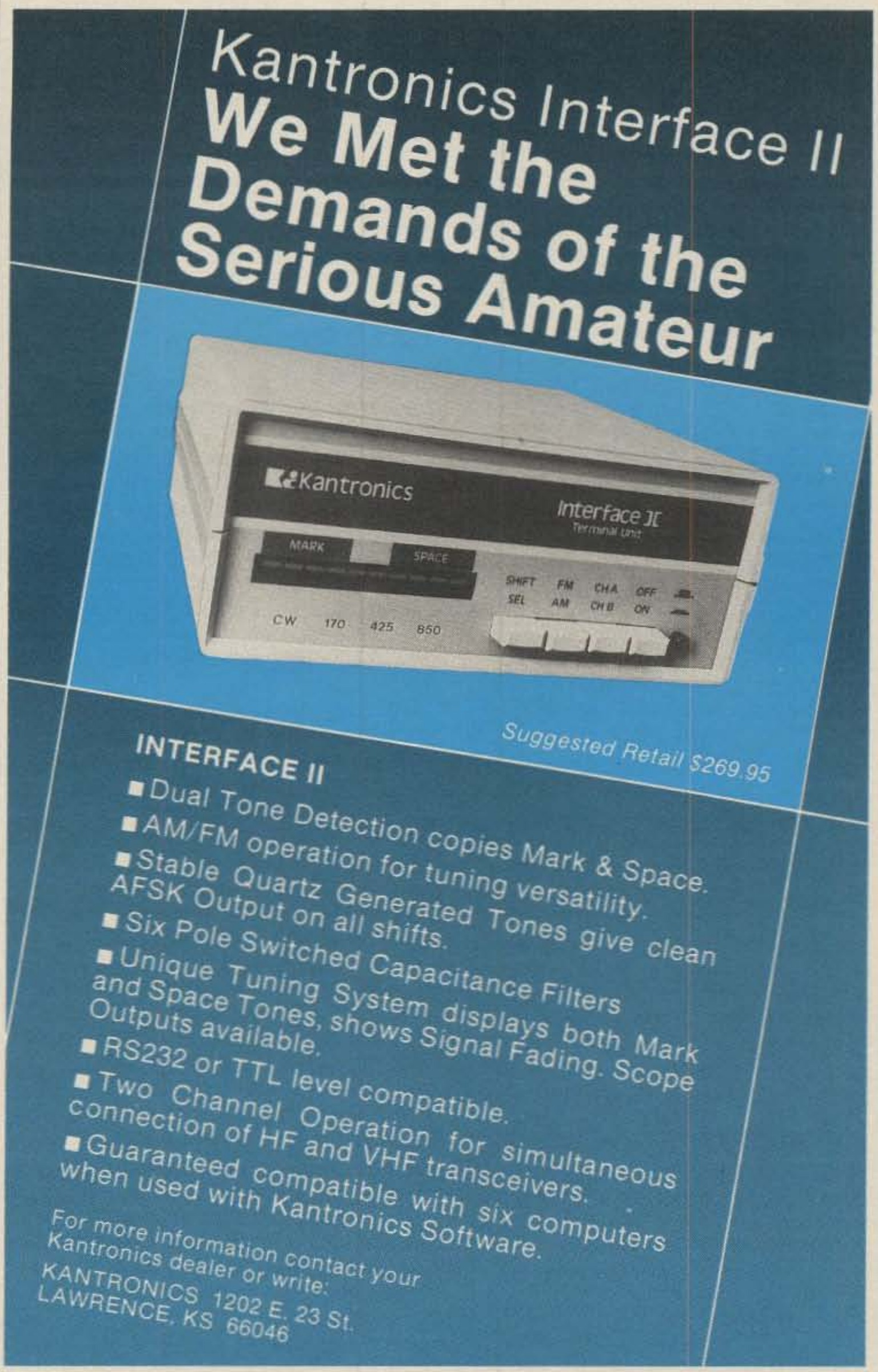
Fig. 6 shows "screen dumps" of a set of three-element cubical quad dimensions produced by the program. The first screen shows element wire length and spacing between elements, while the second screen shows the length of each spider arm and boom. Note the eight "cases" present in the example.

The Antenna Design Software package is sold for $15 and includes a 20-page user's manual. Contact William P. Smith, K3LF, 3767 Cold Spring Creamery Rd., R.D. #2, Doylestown, PA 18901.

Wrapping It Up

In this month's column we have examined several antenna and antenna-accessory products, taken a look at reader mail, and highlighted some useful new hamshack software. Next month we'll continue our peek into interesting products and the companies behind them. See you then.

73, Karl, W8FX



VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

This is the first of what we all hope will be a long-awaited and valued addition to the pages of CQ: a VHF Column. Not since the good old days of Bob Brown, K2ZSQ, and Allen Katz, K2UYH, the CQ VHF Century Club, and the CQ VHF Contests has CQ endeavored to maintain an ongoing VHF/UHF program. Well, times have changed, the technology has certainly changed, and reaching for the moon is no longer impossible.

Next month we will announce the rules for our new VHF Contest (keep July open), which, as with our other contests, will be worldwide in scope. So whether you are a homebrewer, appliance operator, flea-market junkie, or scrounge (or any combination thereof), there will be something for you. The realm of DXing and contesting can and will take on a new meaning as you follow each column.

Initially, the column will follow a tutorial format—a how and why things are the way they are—and later it will broaden to include anything that will increase your enjoyment and skill as an ardent or novice VHF operator. As with all of our columns, we welcome your input and suggestions. If you have some circuit ideas, operating hints, or unusual pictures, send them to Steve.

Steve Katz, WB2WIK, is a noted VHF enthusiast from Budd Lake, NJ. He has been active on VHF/UHF bands since 1965 and spends much of his spare time homebrewing new VHF/UHF gear and improving his station for maximum performance on these bands. —K2EEK

In this series I will attempt to answer the most commonly asked questions about VHF and UHF practices, operations, and equipment. In my experience, the biggest area of confusion and misinformation about VHF in general is the subject of propagation and DX capability: Amateurs whose sole VHF experience is operating the local 2 meter FM repeater are often amazed to hear me speak of thousand-mile QSO's on this band. They don't understand how this is even possible, considering they run out of range of the local repeater when they're only 50 miles away. Therefore, I'll begin with propagation and station capability and take it from that point forward.

The major influences on HF (3–30 MHz) propagation are *ionospheric*. The ionosphere is that part of our stratosphere 25 to 250 miles above the earth; this region is characterized by an abundance of free electrically charged particles which tend to reflect radio signals in the HF range. The ionosphere, which is "above" our weather system and therefore contains no clouds and maintains nearly constant temperature regardless of altitude, has various stratifications, or layers, which offer somewhat different reflection qualities for the enhancement of RF long-range propagation. You are undoubtedly familiar with the "*F*-layer," which is known to produce most of the "skip" on which we depend so highly for worldwide communications in the HF spectrum. The *F*-layer's ability to reflect radio signals varies with the solar cycle and typically produces the most dependable long-range "skip" at the highest frequencies during the cycle peaks which occur about every 11 years.

The major influences on VHF/UHF (30–3000 MHz) propagation[1] are not ionospheric, but *tropospheric*. The troposphere is that part of our atmosphere which lies within about 7 to 10 miles of the earth's surface and is characterized by weather, contains clouds, and exhibits a large change in temperature for a change in altitude. Note that above 3000 MHz there are few observable atmospheric influences on propagation, so our discussion will be limited to the true VHF/UHF spectrum which ends at 3000 MHz.

Contrary to what you may hear while monitoring the local repeater, there is no such thing as "ground wave" on VHF. VHF signals tend to reflect off, rather than propagate along, the earth, and any "ground wave" effect is insignificant beyond a few hundred feet. Signals are propagated via the *direct wave*, which is the common mode for "line of sight" work popularized by FM repeaters on VHF, or by various tropospheric modes including reflection, refraction, scatter, and ducting. The more esoteric weak-signal modes used by VHF DXers (e.g., meteor-scatter[2] and moonbounce[3]) are neither tropospheric nor ionospheric.

How far *is* "line of sight"? As any aviator can tell you, it isn't very far at lower altitudes. If you've ever stood on a beach by the ocean and looked out to your visual horizon, how far could you see? Probably about 7 miles on a clear day—not very far. VHF path loss would be quite low—about 120 dB—for about 33% beyond your line of sight, or about 9.3 miles; beyond this distance path losses increase rapidly, yielding weaker and weaker signals. The 120 dB path-loss figure is a known quantity for path loss to the visual horizon at 144 MHz; it's about 122, 123, and 124 dB, respectively, on 220, 432, and 1296 MHz. These numbers may seem large, but the losses are easily overcome with even the most modest equipment.

The average path losses increase rapidly over longer distances at VHF/UHF. Using 144 MHz, the most popular VHF band, as an example, I've tabulated average path loss versus distance[4]:

Distance, miles	Path loss, dB
10	135
20	149
30	163
40	169
50	175
100	195
200	200
300	214
400	229
500	241

This chart contains information for the *average* path loss over smooth terrain without tropospheric enhancement.

How can we develop enough station gain to overcome such severe path losses? This isn't difficult, at least up to 200 dB or so. The last 40–60 dB required for the esoteric modes are much tougher to come by.

If we express all terms in dB related to a standard power level (like 1 mW), we can quickly calculate station gain as shown in the following:

$$G = -(\text{RX sens in dBM}) + (\text{TX pwr in dBM}) + (2 \times \text{ANT HEIght gain in dB}) - (2 \times \text{FEEDline loss in dB}) - (\text{S/N reqd. in dB})$$

or shown more simply,

$$G = -(RX) + (TX) + (2 \times ANT) + (2 \times ANT\ HEI) - (2 \times FEED) - (S/N)$$

where
G is overall station gain;
RX is receiver sensitivity in dBm;
TX is transmitter power in dBm;
ANT is antenna gain in dB;
ANT HEI is antenna height gain in dB;
FEED is transmission, or feedline loss in dB;
S/N is the signal-to-noise ratio required to make contact.

Let's put some numbers in these slots. For a typical 2 meter station owned by a casual VHF operator, we can assume the following:

RX sensitivity in dBm would be −136 dBm; this represents a receiver having a

*24 Louis Dr., Budd Lake, NJ 07828

Say You Saw It In CQ

noise figure of 2.5 dB and a bandwidth of 3 kHz.

TX power in dBm would be +50 dBm, which is 100 watts output; this assumes a typical multi-mode transceiver plus an amplifier.

ANT gain in dB would be 14 dB, about average for a good, commercially made 2.2 wavelength-long Yagi.

ANT HEIght gain would be 2 dB average for an antenna elevated 50 feet above average terrain at 144 MHz.

FEEDline loss would be 2.8 dB for 100 feet of high-quality RG8/U foamed dielectric coax cable at 144 MHz.

S/N ratio required for a successful SSB QSO would be about 6 dB.

Based on these assumptions, let's apply the numbers to the formula and see what a typical, modest 2 meter station might have in total station gain at 144 MHz:

$$G = -(-136) + (50) + (28) + (4) - (5.6) - (6) = 206.4 \text{ dB station gain}$$

I think the figures listed here represent an "average" SSB station on 144 MHz. It is obvious by inspecting the numbers that receiver sensitivity plays the largest role in establishing overall station gain; thus, you should make every effort to improve your station in this area *first*.

A really excellent 144 MHz receiver might have a sensitivity of −139 dBm, or about 0.25 uV. To achieve this, you would need a receiver with a noise figure usable for SSB work. On CW you could reduce the bandwidth to 200 Hz easily, producing a sensitivity of about −149 dBm, or better than .01 uV, assuming a 1 dB noise figure. This is probably the practical limit for VHF receiver sensitivity.

The practical—*and legal*—limit for transmit power output is 1500 watts, or about +62 dBm.

Almost anyone could erect a 144 MHz antenna with 16 dB gain, but to increase gain much beyond this can require considerable tower/rotator strength and real estate. I'd say the "practical" antenna gain limit at 144 MHz (with an amateur's budget) is 23 dB. This would require eight 3.2 wavelength-long Yagis, which would weigh about 100 lbs. and occupy over 500 square feet of antenna frontal area and nearly 11,000 cubic feet of total space! The antenna gain figure is doubled in the formula because the gain is used, and should be about equal, for both transmit and receive.

Antenna height gain in dB is the subject of considerable controversy, but I'd say the maximum any reasonable station could achieve might be 3 dB. This would require considerable height above average terrain, either natural or by virtue of a very tall (over 80 feet high) tower. The height gain figure is doubled in the station gain formula for the same reason the antenna gain figure is doubled.

Feedline losses can approach zero if the station equipment is co-located with the antenna system. However, not many stations do this, and I'd say even a very good station typically has 1 dB feedline loss at 144 MHz. This would allow a very short length of flexible cable, or about 80 feet of ½ inch alumifoam "hardline." The feedline loss figure is doubled in the station gain calculation, since the loss is encountered on both transmit and receive.

The signal-to-noise ratio required for a QSO depends on the mode used and the operators' skill and patience. While a 1 dB S/N might be enough for a c.w. contact between skilled operators, 6 dB might be the minimum for an SSB contact, and 14 dB might be the minimum for an FM QSO. For the sake of argument, let's assume a 1 dB S/N is all that's required for a CW contact between skilled operators using narrow-bandwidth equipment.

Using all the "ideal" numbers, how much station gain can we achieve at 144 MHz?

$$G = -(-149) + (62) + (46) + (6) - (2) = 260 \text{ dB}$$

Wow! 260 dB! Quite an improvement over the 206 dB derived from the original calculation based on a "typical" station. This 54 dB difference in station perfor-

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mance is a very important difference. It makes or breaks a station's ability to make those long-haul DX QSOs under average conditions. An operator whose station has an overall gain of 260 dB can be mighty proud, for he or she is in the upper 1 percentile of all VHFers. This is a station ready for the most esoteric of all VHF modes—moonbounce.

So far this discussion has been limited to what can be done under *average* conditions, without corrections for terrain and tropospheric enhancement. Terrain, or topography, can be a real help or hindrance to VHF communications. Ask any operator who lives in a deep valley or atop a lofty mountain peak. From a mountaintop one might enjoy a line of sight of 200 miles, creating the need for drastically modifying all the path loss numbers of the table in this article. You see, the path loss table assumes your line of sight to be only 7 miles or so—thus the enormous change in path loss from 135 dB at 10 miles to 195 dB at 100 miles. This 60 dB change, technically correct for an average situation, might become only 20 dB if a location 100 miles distant can be visually sighted! (See footnote 4.)

Just as the ionospheric *F2*-layer can become a mirrorlike reflector of HF signals at the MUF[5] and thus allow reliable worldwide communications with little path loss, there are unique tropospheric conditions which allow extended-range communications at the very-high and ultra-high frequencies. We shall discuss these major influences on VHF/UHF propagation and delve into the esoteric modes of meteor-scatter, aurora, and moonbounce next time. Until then, why not run through the station gain calculation for *your* VHF station, if you have one, and see how DX-worthy it is—or isn't? It's the place where we all have to start.

73, Steve, WB2WIK

Footnotes

1. The exception is during periods of intense ionization of the ionospheric *F*-layer, usually occurring at sunspot activity peaks, when *F2* propagation up to about 70 MHz becomes common.

2. **Meteor-scatter** is propagation by means of reflecting signals off the ionized trails of meteors. This varies from very low (random meteors) to reasonably high (during major meteor showers).

3. **Moonbounce**, which is also called "EME" (Earth-Moon-Earth), is propagation by means of reflecting signals off the surface of the moon. The possibilities for moonbounce at 50 MHz vary from zero (at periods of intense ionization of the *F*-layer) to very good; at 144 MHz and above, there is always the possibility of EME if the moon can be "sighted" and the station equipment is adequate to overcome the path losses.

4. Path losses at radio frequencies are generally related directly to distance by a square law—i.e., path loss will increase as a square function of the change in distance. *Example:* A station 10 miles distant produces a received signal strength of 0 dBm. If the station were relocated to a position 20 miles distant, its received signal strength would be reduced by dx^2 (dx = change in distance), or 6 dB, producing a strength of −6 dBm. This only applies to line-of-sight paths, however, and the earth's curvature restricts our line of sight to a finite distance from any location on the planet. Normal wave refraction allows our radio "line of sight" to be typically 33% beyond visual, or actual, line of sight.

5. **MUF** = **M**aximum **U**sable **F**requency, the highest frequency for which the *F*-layer appears reflective. This is the frequency at which the *F*-layer propagation will suffer the lowest losses, producing the strongest "skip" signals over DX.

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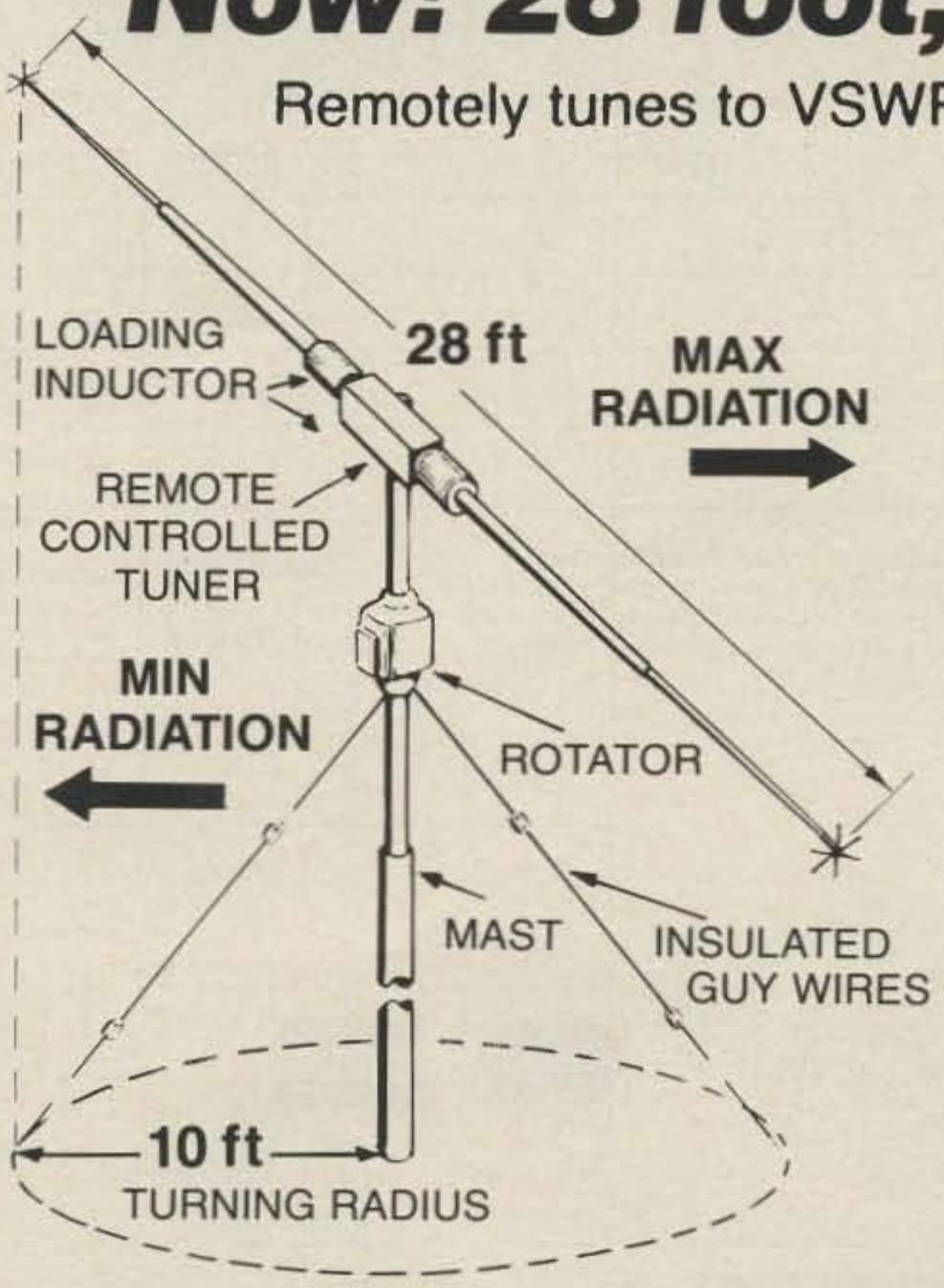

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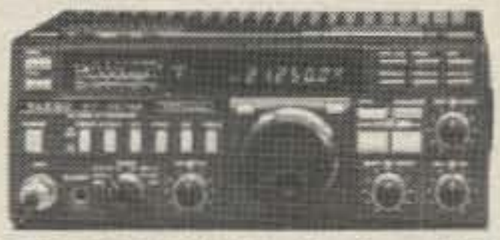

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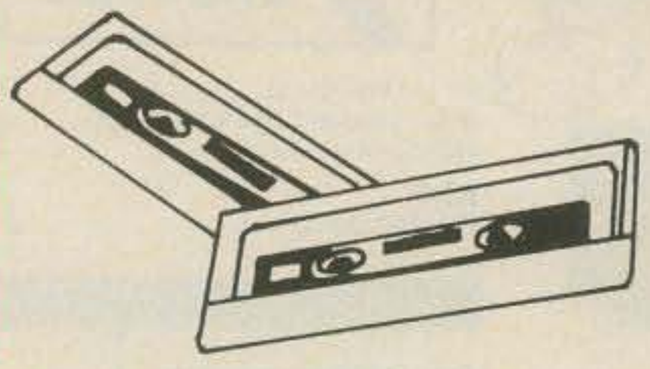

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Ticket Talk

BY DICK BASH*, KL7IHP

Happy New Year and welcome to the January, 1985 column of *Ticket Talk*, a column devoted to answering questions you may have about the amateur radio licensing structure. If you still have questions, please write me c/o *CQ* or else at the address shown below. *A reply will be sent to those enclosing a self addressed stamped envelope.* If you can't wait for an answer, either call me at (415) 278-8275 between 10AM and 6PM, Monday thru Friday, California time, or else call your local FCC Field Office.

Who are the V.E.C.s?

Now that the FCC no longer gives amateur radio examinations (a sad mistake!), we as hams must take our exams (with the exception of the Novice Class test) before a 3 person volunteer examining team who are under the direction of a Volunteer Examiner Coordinator (VEC). To find out where and when the exams are held in your area, you can do one of two things: either contact the FCC Field office in your area and have them tell you or else contact the VEC (or VECs if there is more than one serving your area) and ask them. If you check with the FCC, you'll find that they only know 30 days ahead of time where and when an exam is being held. It is best to contact the VEC directly and ask. Enclose a self addressed stamped envelope if you are writing to one of the VEC's (the postage is murder!). There are two organizations which are serving all areas. The first is Fred Maia - W5YI, P.O. Box 10101, Dallas, TX 75207, phone 817-461-6443 (a new phone number, by the way). The second is the American Radio Relay League (ARRL), 225 Main Street, Newington, CT 06111, phone 203-666-1541. Here is the latest listing of the VECs (as of November 5, 1984) and the areas they cover. Please do not lose this list! Make copies and pin them up in your shack and on your club's bulletin board. This is "rare" data. Keep this list. I will add to it as information about other VEC's is received here. Our thanks to W5YI for his help in compiling this list.

Region 1 *(CT, MA, ME, NH, RI, and VT)* Contact either W5YI or the ARRL at the addresses listed above.

Region 2 *(NJ and NY)* — Contact either W5YI or the ARRL at the addresses listed above or one of the following organizations:
Metroplex Amateur Communication Assoc., P.O. Box 237, Leonia, NJ 07606
Schenectady Amateur Radio Assoc., Inc., P.O. Box 6, Alpaus, NY 12008.

Region 3 *(DC, DE, MD, and PA)* — Contact either W5YI or the ARRL at the addresses listed above or else the following organization:
Laurel Amateur Radio Club, Inc., P.O. Box 3039, Laurel, MD 20708.

Region 4 *(AL, FL, GA, KY, NC, SC, TN, and VA)* — Contact either W5YI or the ARRL at the addresses listed above or one of the following organizations:
Central Alabama VEC, 606 Tremont St., Selma, AL 36701
Western Carolina Amateur Radio Society, P.O. Box 16189, Asheville, NC 28816
Charlotte VEC, 227 Bennett Lane, Charlotte, NC 28213
Triad Emergency Amateur Radio Club, 3504 Stonehurst Place, High Point, NC 27260

Region 5 *(AR, LA, MS, NM, OK, and TX)* Contact either W5YI or the ARRL at the addresses listed above or one of the following organizations:
Dallas Amateur Radio Club, Inc., P.O. Box 173, Dallas, TX 75211
Mid South VEC, 2020 St. Elmo, Memphis, TN 28213

Region 6 *(California)* — Contact either W5YI or the ARRL at the addresses listed above or one of the following:
Greater L.A. Amateur Radio Group, c/o Steven Shafit, 21921 Lanark - #201, Canoga Park, CA 91304 (for tests in southern California)
SANDARC VEC, P.O. Box 5023, La Mesa, CA 92041 (for tests in southern California)
Sunnyvale Amateur Radio Club, P.O. Box 60031, Sunnyvale, CA 94088, phone 408-255-9000 for recording (for tests in northern California)

Region 7 *(AZ, ID, MT, NV, OR, UT, WA, and WY)* — Contact either W5YI or the ARRL at the addresses listed above or else the following:
Boeing Employees Amateur Radio Society, P.O. Box 3707, Seattle, WA 98124

Region 8 *(MI, OH, and WV)* — Contact either W5YI or the ARRL at the addresses listed above or else the following:
Dayton Amateur Radio Assoc., P.O. Box 44, Dayton, OH 45401. We have received unconfirmed rumors that DARA is getting out of the VEC program now that W5YI and the ARRL are in it. Someone verify or cancel this rumor!

Region 9 *(IL, IN, and WI)* — Contact either W5YI or the ARRL at the addresses listed above or else the following:
DeVry Amateur Radio Society, 3300 N. Campbell Avenue, Chicago, IL 60618

Region 10 *(CO, IA, KS, MN, MI, NE, ND, and SD)* — Contact either W5YI or the

---

*Bash Educational Services, Inc., P.O. Box 2115, San Leandro, CA 94577

Say You Saw It In CQ

ARRL at the addresses listed above or else the following:
PHD Amateur Radio Assoc., P.O. Box 11, Liberty, MO 64068

Region 11 *(Alaska)* — Contact either W5YI or the ARRL at the addresses listed above or else the following:
Anchorage Amateur Radio Club, P.O. Box 101987, Anchorage, AK 99510

Region 12 *(Caribbean Insular Areas)* — Contact either W5YI or the ARRL at the addresses listed above or else the following:
Director, MARS, P.O. Box 7388, Cidra, PR 00639

Region 13 *(Hawaii and the Pacific Insular Areas)* — Contact either W5YI or the ARRL at the addresses listed above or else one of the following:
Honolulu Amateur Radio Club, 3251 Pakanu St., Honolulu, HI 96822
Koolau Amateur radio Club, 45-529 Nakuluai St., Kaneohe, HI 96744

If you're wanting an exam in an area of the world not listed here (Africa, Europe, etc.), I suggest you contact either W5YI or the ARRL at the addresses listed above. I suspect that W5YI is your best bet although the ARRL may be able to help.

If you're a new VEC, be sure to send me the info and I'll add your name to the list. We are urging VEC's to also tell their examiners to test Novices along with other classes of licensees. Some of the new folks do not know any hams in their area and they do read this column!

New Questions on Tests!

On November 5th we received the changes the FCC made to the Technician/General list of questions (PR Bulletin 1035B, November 1984) and are proceeding with our book. If you've been study anything else, you've been studying the wrong stuff! This is the reason that many publishers (including this one) have delayed publishing their book. So, when you go buy study materials for the Technician/General test, be darn sure that the book covers the November, 1984 questions. You can quickly see that all of this is driving the publishers nuts. Also, the FCC is going to change/correct the questions in the Advanced and Extra pool because (like the Technician/General questions) many are technically incorrect. Thus you may see the publishers stalling until the revised questions are out before they print up their books. It is better to be slow in publishing the book and be right than to jump out there and spend thousands of dollars and publish the wrong stuff. This economy isn't that healthy yet!

If you want a copy of the new PR Bulletin 1035 dated November, 1984 write the Federal Communications Commission, Personal Radio Bureau, Washington, DC 20554.

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***PLEASE NOTE PRICE CHANGE:** As of January 1, 1985, cost for a non-commercial ad will be 20 cents per word, and cost for a commercial ad will be 60 cents per word (both rates include abbreviations and addresses). Non-commercial ads of 3 lines maximum will remain free to CQ subscribers who enclose a recent mailing label.

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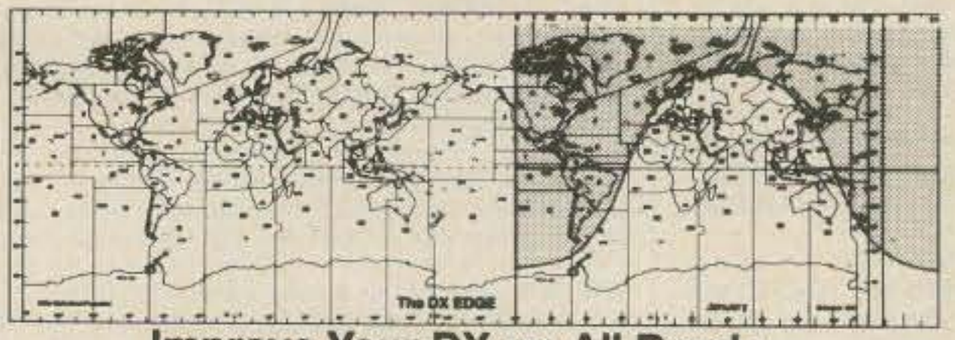

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WANTED: Hammarlund HQ-180, need coils and other parts. Please send list of HQ-180 coils. Pay top $$$. Jim McGregor, KA7QGK, 1112 Ave. D N.W., Gt. Falls, MT 59404.

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WANTED: Yaesu NC2 AC adapter/charger for FT207R handheld 2 meter transceiver. State condx and price. Keith Ackley, W5SQS, Route 1 - Box 245, Buchanan Dam, TX 78609.

GONSET G-50 a.m. transceiver, vfo, 50 watts on 6 meters, nice, $35 plus UPS 35 lbs. WA2PCL, 101-23 Lefferts, Jamaica, NY 11419.

833A TUBES w/sockets & filament transformers $75. Many other parts. W7KE, 1109 S 2nd St., Hamilton, MT 59840.

FOR SALE: Two meter Motorola HT-200 $100. Will consider swap for HW-8. Rick Thompson, 626 Valkyrie, K.I. Sawyer A.F.B., MI 49843.

SELL: DL-QTC (German); QST; CQ; etc. WU FAX, TTY, etc. SASE for listing. Paquee, 53 Jerome Ave., Trumbull, CT 06611.

RCA Volt Ohmyst WV-97 $30, Spectrum Analyzer M-19 Singer 1 kHz to 25 MHz $150, Johnson 6 & 2 $35, CRT Tester $10. K6KZT, 2255 Alexander, Los Osos, CA 93402.

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ELECTRONIC PARTS for sale. W2EZM, 431 Oakland Ave., Maple Shade, New Jersey 08052.

FOR SALE: Kenwood TS-520S, VFO-520, excellent cond., manuals, original carton, $450. WD5JWG, 4102 Gatewood, Crosby, TX 77532, phone 713-328-4554.

WANTED: Hallicrafters PS-150-120 AC power supply for SR-160. Gordon Wolterstorff, RR 3, Box 289, Kankakee, IL 60901.

FOR SALE: Heath HR1680 receiver $150. W2EZ, 9 Whitney Farms Circle, Fairport, NY 14450.

WANTED: I need a schematic or manual for a Communications Power Inc. model WM 1000 wattmeter. I will pay any costs incurred. Rich, AD6X, 866 Yolo Way, Livermore, CA 94550, (415) 447-7287.

RADIO ARCHIVES "views/news of Radio enthusiast" SASE. Arnold Timm, 2308 Garfield #304, Minneapolis 55405.

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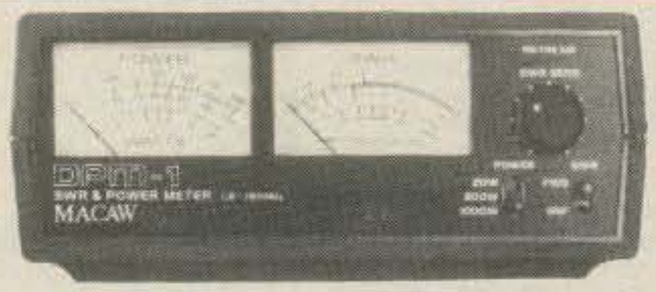

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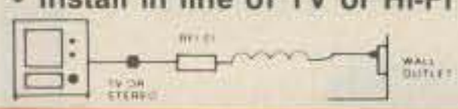

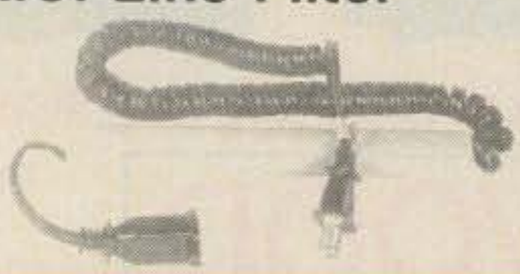

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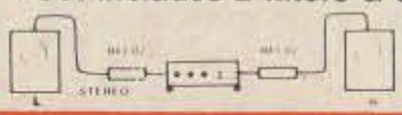

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FOR SALE: LBO-310 Ham oscilloscope, like new, cost $219.95, will sell for $120. John J. Weyrauch, Box 230 RD 4, Lyonbrook Rd., Norwich, NY 13815.

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SWAP: Lafayette Model KT-340 Receiver for Operators Manual with Schematic for Gonset Model 500-W R. F. Power Amplifier SSB-CW-Phone. Owen W. Fink, P.O. Box 204, Middleport, OH 45760.

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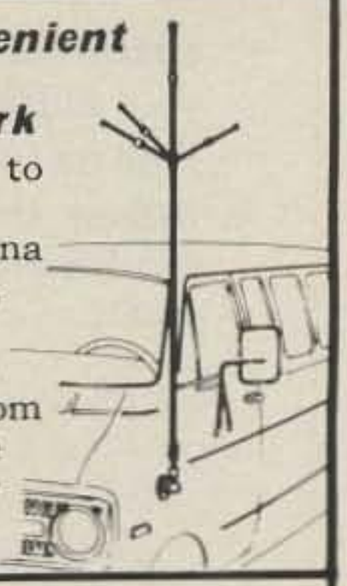

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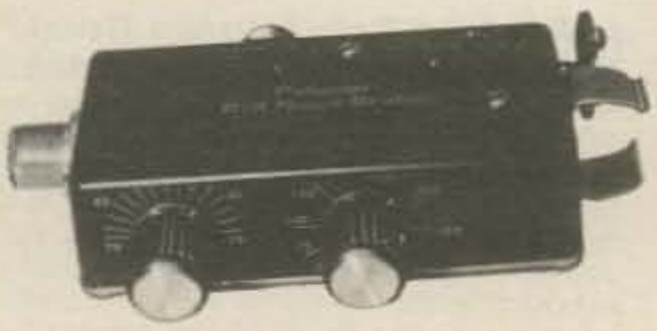

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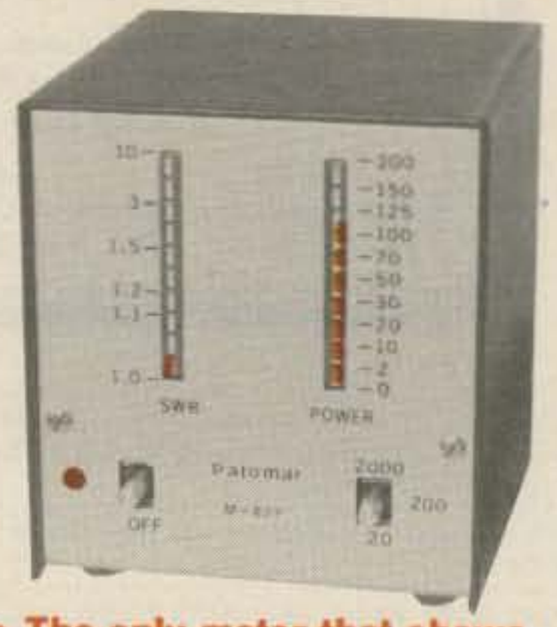

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